NURSES HANDBOOK OF DRUGS AND SOLUTIONS

STIMSON

M. C. Flood

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REVISED EDITION

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PREFACE

THIS book has two objects: first, to present as much Materia Medica, in a simple and useful form, as is essential for a nurse to know; and second, to omit as far as possible all that is not essential, albeit interesting and useful. It is not a reference book, but if mastered as a text-book it is hoped that the information it contains will enable nurses to have a sense of security and familiarity in the handling of drugs that will be of use and satisfaction to them in the practice of their profession, and also, that by its aid they will have no difficulty in preparing themselves for their examinations on the subject for State Registration.

It is recognized that the Practical Classification is open to criticism as illogical and arbitrary. But it has not been made without reason. A study of many text-books of Materia Medica for medical students and those for nurses has shown the great variety and the complexity of the classifications of drugs as therein presented. Some authors believe that it is impossible properly to classify drugs according to their action, as the majority of drugs have several equally important actions; therefore, they arrange the drugs alphabetically. Some classify according to the physiological action; some according to the therapeutic uses. The last arrangement is accepted by most writers as the best method. It is, however, a somewhat complicated and much subdivided method. The arrangement in these pages has worked itself out from a series of lessons based on the most common and important drugs which are administered by nurses in the wards of large general hospitals. They fall into

groups classified according to their importance and therapeutic action. It is, of course, as impossible to draw a line between the essential and the nonessential as it is to make a list of drugs arranged in sequence according to their power and importance. Such things are a matter of opinion and somewhat of locality. But a practical, easily memorized arrangement should be tried.

A nurse's use of Materia Medica is limited, and lies along different lines from the uses to which a doctor applies his knowledge of the subject, as it is beyond her province ever to prescribe. Still, it is essential that a knowledge of the powerful and important drugs be a part of her working equipment, that she may be able to afford the intelligent assistance to the physician, on behalf of the patient, that is required of her.

To make such a knowledge an easy acquirement, this book has been prepared for use as a practical handbook, as well as a classroom manual.

PREFACE TO REVISED EDITION

In order to eliminate all drugs which are no longer commonly used, and to add such new preparations as have been brought into use since this book was written in 1911, it has been thoroughly revised by Dennis E. Jackson, M.D., Ph.D., Associate in Pharmacology of Washington University Medical School, St. Louis, Mo. J. C. S.

St. Louis, 1915.

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PART I

DEFINITIONS, WITH EXAMPLES

Alkaloids are organic basic substances. Most of these are obtained directly from plants, as Morphin from the poppy and Atropin from Belladonna. But others, known as artificial alkaloids, are made synthetically in the laboratory. Most alkaloids are very poisonous and the doses are consequently small. Their names always end in **in.**

Alteratives are remedies whose action may be beneficial, especially in chronic diseases. They are supposed to "alter" the course of the disease, possibly by some indefinite action on the general nutrition. Arsenic, Iodids, Mercury, Colchicum, Phosphorus, Cod-liver Oil.

Analgesics or **Anodynes** are remedies which relieve pain.

Opium, Morphin, Aspirin, Phenacetin, Acetanilid, Antipyrin, Chloral, Belladonna.

Local Anodynes are remedies which lessen the sensibility of the skin or tissues when applied locally. Local Anodyne and Local Anesthetic are terms used almost interchangeably, the principal object in their use being the local alleviation of pain.

Novocain, Cocain, Stovain, Orthoform, Chloretone, Aconite, Menthol, Ethyl Chlorid (spray), Ether (spray), Alcohol, Phenol.

General Anesthetics are substances used to produce unconsciousness complete enough to permit surgical operation.

Ether, Nitrous Oxid (gas), Chloroform, Scopolamin, Morphin.

Antidotes are agents used to counteract the effect of poisons.

Antiperiodics are remedies which oppose the periodic return of symptoms.

Quinin, Arsenic, Salicylates, Iodin.

Antipyretics are agents which reduce fever.

Phenacetin, Antipyrin, Aspirin, Acetanilid, Pyramidon, Quinin, Aconite, Baths, Sponges, Cold Drinks, etc.

Antiseptics are agents which arrest the development of bacteria, not necessarily destroying them. **Germicide** and **Disinfectant** are almost synonymous terms, and signify that the agents used under these terms are strong enough to destroy micro-organisms.

Mercuric Chlorid (Bichlorid), Phenol (Carbolic Acid), Lysol, Cresols, Creosol, Creolin, Betanaphthol, Formaldehyd, Silver Nitrate, Argyrol, Protargol, Tincture of Iodin, Hydrogen Peroxid, Boric Acid, Potassium Permanganate, Lime, Iodoform, Urotropin, Fire, Heat (moist 212°, dry 302° F.).

Astringents are agents which cause contraction of the tissues and lessen discharges.

Vegetable astringents are Tannic Acid, Gallic Acid, Galls, Oak Bark; mineral astringents are Alum,

Lead Acetate, Silver Nitrate, Zinc Sulphate, Bismuth Salts, Zinc Oxid, and Dilute Acids.

Cardiac Sedatives are agents which slow or weaken the heart's action.
Aconite, Veratrin, Chloral.

Cardiac Stimulants are agents which accelerate or strengthen the heart's action.
Digitalis, Adrenalin, Caffein, Camphor.

Carminatives are agents which expel gas from the stomach and intestines.
Ginger, Turpentin, Asafetida, Camphor, Capsicum, and the Volatile Oils of Cloves, Cinnamon, Peppermint, Mustard, Sassafras, Fennel, etc.

Cathartics are drugs employed to cause intestinal evacuation. **Laxatives** have a mild action. Examples: Cascara Sagrada, Magnesia, Sulphur. **Purgatives** are more powerful. Examples: Calomel, Castor Oil, Aloes, Rhubarb, Senna. **Drastics** have a violent action. Examples: Croton Oil, Colocynth, Jalap, Podophyllum, Gamboge. **Hydragogues** produce copious watery stools. Examples: Magnesium Sulphate, Sodium Phosphate, Magnesium Citrate, Potassium and Sodium Tartrate.

Caustics or **Corrosives** are agents which in strong solution chemically destroy the tissues.
Nitric Acid, Sodium Hydrate.

Cerebral Depressants are agents which reduce mental activity.

Chloroform, Ether, Alcohol, Chloral, Veronal, Opium, Hyoscin, Cannabis Indica, Bromids.

Cholagogues are agents which increase the quantity of bile secreted.

Ox Bile, Salicylates.

Demulcents are substances which protect surfaces mechanically, or soothe inflamed areas.

Acacia (Gum Arabic), Tragacanth, Starch, Sweet Almonds, Licorice, Glycerin, Flaxseed, Honey, Barley, White of Egg, Olive Oil.

Diaphoretics or **Sudorifics** are agents which produce sweat.

Pilocarpin, Ipecac, Dover's Powder (Ipecac and Opium), Aconite, Alcohol, Salicylates.

Diuretics are agents which increase the secretion of urine.

Caffein, Theophyllin, Theobromin, Agurin, Diuretin, Calomel, Digitalis, Strophanthus, Potassium Salts, Sodium Salts, large quantities of water or other beverages.

Ecbolics or **Oxytocics** are agents which produce uterine contractions.

Ergotoxin, Ergamin, Pituitrin, Quinin, Strychnin, Oil of Rue.

Emetics are agents which produce vomiting.

Alum (5–30 grs.), Zinc Sulphate (10–30 grs.), Copper Sulphate (4 grs.), Tartar Emetic (1–2 grs.), Apomorphin (hypodermic $\frac{1}{10}$ gr.), Mustard (dr. 1+), Ipecac (10–30 grs.), Tepid Water in quantity, Salt.

Emmenagogues are remedies which have been supposed to restore the menstrual function.

Iron, Strychnin, Ergot.

Emollients are oily substances used to protect the skin and render it more elastic.

Lard, Mutton Suet, Vaseline, Petrolates (liquid), Oils, Glycerin, Lanolin, Salves or Ointments.

Expectorants are agents which promote the secretion and expulsion of mucus from the bronchial membrane.

Ammonium Chlorid and Carbonate, Benzoin, Balsam of Peru, Balsam of Tolu, Creosote, Tar, Squill, Terpin Hydrate, Eucalyptus, Ipecac, Tartar Emetic, Apomorphin ($\frac{1}{30}$ to $\frac{1}{20}$ gr.), Strychnin.

Hematinics are remedies which increase the hemoglobin of the blood.

Iron, Arsenic, Cod-liver Oil.

Hypnotics are remedies which produce sleep. If they cause mental depression also, they are called **Narcotics.**

Alcohol, Urethane, Hedonal, Sulphonal, Paraldehyd, Chloral, Chloretone, Veronal, Bromids, Opium, Morphin, Codein, Heroin, Hyoscin, Cannabis Indica.

Irritants are drugs which set up reactions in the tissues. In excess these reactions are always painful.

Mustard, Cantharides.

Mydriatics are remedies which cause dilatation of the pupil of the eye.

Atropin, Cocain, Hyoscyamin, Homatropin.

Myotics are remedies which cause contraction of the pupil.
Eserin, Pilocarpin, Opium, Morphin.

Respiratory Depressants are agents which decrease the number of respirations a minute.
Opium, Morphin, Codein, Heroin, Chloral, Alcohol.

Respiratory Stimulants are agents which increase the number of respirations a minute.
Caffein, Strychnin, Atropin, Camphor, Ammonia, Electricity, Cold Douche.

Rubefacients or **Counter-irritants** are agents which cause reddening and irritation of the skin when applied locally.
Mustard, Turpentin, Capsicum, Cantharides, Iodin, Alcohol, Hot Poultices, etc.

Sedatives are agents which allay excitement, irritation or pain. General Sedatives depress the central nervous system. These include narcotics and anesthetics. Local Sedatives depress sensory nerves, trunks or endings. They include local anodynes and anesthetics.

Sialogues are agents which increase the flow of saliva.
Pilocarpin, Eserin, Acids, Alcohol, Mercury, Iodids, Ipecac.

Spasmodics or **Convulsants** are drugs which taken in poisonous doses produce spasms or convulsions.
Picrotoxin, Atropin, Cocain, Camphor.
(Antispasmodics are remedies used to arrest spasms or general nervous irritability, but the term is now

seldom used. Asafetida, Valerian, Hops, Lactucarium, Belladonna.)

Stimulants are agents which increase the activity of an organ or a group of organs.
Digitalis, Caffein, Camphor, Strychnin, Ammonia.

Stomachics or **Gastric Tonics** are agents which increase appetite and promote digestion.
Gentiana, Quassia, Calumba, Quinin, Strychnin, Iron, Arsenic, Alcohol, Pepper, dilute alkaline solutions before meals.

Styptics or **Hemostatics** are agents which arrest bleeding.
Adrenalin, Cocain, Ferric Chlorid, Tannin, Alum, Local cold.

Urinary Acidifiers are agents which make the urine acid.
Benzoic Acid, Sodium-Dihydrogen Phosphate, Urotropin.

Urinary Alkalinizers are agents which make the urine alkaline.
Potassium Salts, Vegetable Diet.

COMMON PREPARATIONS OF DRUGS, WITH EXAMPLES

Aqua — a solution in water of a volatile substance.
Aqua Rosæ, Aqua Ammoniæ, Aqua Chloroformi.

Cerate — a preparation for external use, the base of which is wax, lard or petrolatum.
Camphor Cerate.

Decoction — a solution made by boiling a substance in water.

Tea, Decoction of Dandelion.

Elixir — a sweetened aromatic alcoholic preparation.

Elixir of Gentian, of Ferric Chlorid, of Pepsin, etc.

Emulsion — a preparation in which an oily substance is kept suspended in water by means of some viscid substance, such as yolk of egg, gum acacia, etc.

Emulsion of Cod-liver Oil (Emulsum Olei Morrhuæ).

Extract — a solid preparation of a drug made by evaporating a solution of the drug.

Extract of Opium (Extractum Opii).

Fluid Extract — a concentrated solution of a vegetable drug, usually a tincture, of definite strength, a minim of every fluid extract being equivalent to a grain of the drug.

Fluid Extract of Ergot (Fluidextractum Ergotæ), Fluid Extract of Nux Vomica (Fld. Ext. Nucis Vomicæ).

Glycerite — a mixture of a medical substance with glycerin.

Glyceritum Acidi Tannici, Iron Glycerite (Glyc. Ferri).

Infusion — a solution of a vegetable substance in water without boiling.

Infusion of Digitalis (Infusum Digitalis), Compound Infusion of Senna (Infusum Sennæ Compositæ).

Liniment — an oily liquid preparation to be rubbed on the skin.

Camphor Liniment (Linimentum Camphoræ), Chloroform and Belladonna Liniment, etc.

Liquor — a solution in water of a non-volatile substance.
Lime Water (Liquor Calcis), Solution of Potassium Arsenite or Fowler's Solution (Liquor Potassii Arsenitis).

Mixture — a preparation in which two or more substances are mixed.
Rhubarb and Soda Mixture (Mistura Rhei et Sodæ), Compound Licorice Mixture or Brown Mixture (Mistura Glycyrrhizæ Compositæ).

Ointment (Unguentum) — a mixture of a medical agent in a basis of lard, suet, etc., or petrolatum.
Boric Acid Ointment (Unguentum Acidi Borici), Mercurial Ointment (Ung. Hydrargyri).

Spirit — an alcoholic solution of a volatile substance.
Sweet Spirits of Nitre (Spiritus Ætheris Nitrosi), Whisky (Sp. Frumenti), Aromatic Spirits of Ammonia (Sp. Ammoniæ Aromaticus).

Suppository — a solid body containing a medical substance, for insertion in the vagina, rectum, or urethra.
Glycerin Suppositories (Suppositoriæ Glycerini), Opium or Belladonna Suppositories, etc.

Tablet — a solid body made by compression of a powdered drug or mixture of drugs in a suitable mold.
Soda Bicarbonate, Calomel.

Tincture — an alcoholic solution of a non-volatile medicinal substance (with the exception of Tr. of Iodin, for Iodin is volatile).

Tincture of Aconite, Opium, etc. (Tinctura Aconiti, Opii, etc.), Tincture of Nux Vomica (Tr. Nuc. Vom.).

Wine — a tincture with white wine as a base.

Wine of Iron (Vinum Ferri), Wine of Colchicum Seed (Vinum Colchici Seminis).

COMMONEST METHODS OF APPLYING DRUGS

1. To the Skin
   Inunctions (Oils, Liniments, Ointments, etc.)
   Contact without rubbing (Baths, Blisters, Cooling Applications, etc.)
2. To Mucus Membranes
   (Gargles, Sprays, Douches, Powders, etc.)
3. To Wounds and Diseased Tissues
   (Antiseptic Powders, Ointments, Solutions, etc.)
4. To the Respiratory Tract
   Inhalation of fumes or vapors (Anesthetics, etc.)
5. To the Circulatory System
   Hypodermic Injection
   Intravenous Infusion
   Hypodermoclysis
6. To the Alimentary Canal
   By Mouth (Pills, Powders, Solutions, etc.)
   By Rectum (Enemata, Suppositories, etc.)

CONSIDERATIONS FOR THE MODIFICATION OF DOSAGE

Age. Young's Rule for calculating the dose for a child when the adult dose only is known.

Take the age (in years) of the child as the numerator and the age plus twelve for the denominator. The resulting fraction will be the part of the adult dose to be given. (Example: Age 3 years, $\frac{3}{3+12} = \frac{3}{15}$ or $\frac{1}{5}$, which is part of adult dose to be given.)

Weight. Heavy, muscular persons require larger doses, as a rule, than those who are delicate.

Sex. The dose for a woman is usually smaller than that for a man.

Idiosyncrasy. Certain individuals have a peculiarity of constitution whereby they are affected by a drug or agent in a manner entirely different from the ordinary.

Acquired Immunity. The injection of certain drugs in gradually increasing doses at proper intervals can often be borne without reaction. This is the basis for chronic morphinism, etc. The patient acquires a tolerance for larger and larger doses of the substance.

Pathological Conditions. The dose is modified according to the severity of the disease or the urgency of the case. Thus very large doses of Morphin are tolerated in severe pain, because the action of the

drug is spent in overcoming the pain. In cases of great shock larger doses of stimulants are given than would be required in conditions of slight shock. Pregnancy, menstruation and lactation modify the doses of some drugs. Antipyretics lower fever temperature but not normal temperature when given in medicinal doses.

Accumulative Action. Some drugs are excreted from the body so slowly that the whole of one dose is not excreted before the next dose is given, consequently the amount present in the body gradually increases. (Examples: Arsenic, Digitalis.)

Time of Administration. The body is generally more resistant in the morning, especially in the case of narcotics.

Simultaneous Doses. Drugs which produce similar results (called Synergists or Adjuvants) are often prescribed together, each in correspondingly small doses. (Examples: Calomel and Aloes.) Drugs having opposite actions (called Antagonists) are sometimes given. (Examples: Chloroform and Strychnin.)

Method of Administration. As a rule, drugs act most quickly when given by intravenous injection, next when given by inhalation, next when injected deeply into the muscles, next when taken by stomach, and lastly when injected by rectum. When applied by inunction drugs act much more slowly. The size of the dose varies with the method of application, one dose by hypodermic equaling approximately two doses by mouth and four by rectum.

PART II

WEIGHTS, MEASURES AND SOLUTIONS

Apothecaries' or Troy Weight

Gr.xx, or 20 gr. = 1 scruple (℈)
Gr.lx, or 60 gr. = 1 drachm (ʒ)
ʒviii, or 8 dr. = 1 ounce (℥)
ʒxii, or 12 oz. = 1 pound (℔)

Apothecaries' or Wine Measure

m.lx, or 60 minims = 1 fluiddrachm
ʒviii, or 8 fldr. = 1 fluidounce
ʒxvi, or 16 floz. = 1 pint
ʒxxxii, or 32 floz. = 1 quart

Metric System

Unit of Weight = 1 gramme
Unit of Length = 1 metre (39+ inches)
Unit of Volume = 1 cubic centimetre (c.c.)
1 c.c. of water weighs 1 gramme (at 4° C.)

Volume

1 c.c. = 1 gm. of water in weight
1000 c.c. = 1000 gms. of water
(or 1 litre = 1 kilogramme (kilo) in weight)

Weight

1 gramme or Unit of Weight
1 milligramme (mg.) .001 = $\frac{1}{65}$ gr.

10 milligrammes or 1 centigramme (cg.) .01 = $\frac{1}{6}$ gr.
10 centigrammes or 1 decigramme (dc.) .1 = $1\frac{1}{2}$ grs.
10 decigrammes or 1 gramme (gm.) 1.0 = 15 grs.
1000 grammes = 1 kilo = lb. 2.7 Troy or lb. 2.2 Av.

Length

1 metre or Unit of Length = 40 inches
1 inch = 2.5 centimetres (cm.)
1000 metres = 1 kilometre

Approximate Equivalents

1 gramme = 1000 milligrammes (mgs.)
15 grains = 1 gramme
15 grains = 1 c.c. = 15 minims
1 grain = 65 milligrammes (.065 gm.)
10 grains = 7 decigrammes (.7 gm.)
1 grain is equivalent to 1 minim
4 grammes = 1 fldr.
4 c.c. = 1 fldr.
30 c.c. = 1 ounce (32 c.c. actually)
1000 c.c. = 1 litre or quart
1 minim = .06 c.c.

1 fldr. = 1 teaspoonful, or 4 c.c., or 4 grammes in weight
2 fldr. = 1 dessertspoonful, or 8 c.c., or 8 grammes in weight
8 fldr. = 2 tablespoonfuls, or 30+ c.c., or 30+ grammes in weight
2 floz. = 1 wineglassful, or 60+ c.c., or 60+ grammes in weight

4 floz. = 1 teacupful, or 120+ c.c., or 120+ grammes in weight

8 floz. = 1 glassful (filled to brim), or 240+ c.c., or 240+ grammes in weight

Note I. 1 : 1000 solution always means 15 grains (1 gramme) to the quart ($\frac{1}{10}$%).

Note II. 1 : 100 or 1% solution always means 5 grains (or 5 minims or 325 mgs.) to the ounce. (Literally 4.8 grains.)

Normal Saline Solution ($\frac{9}{10}$ of 1%)

135 grains of salt to the quart (Note I)
9 grammes (by weight) to the quart
2 drachms or two teaspoonfuls to the quart

Note. Locke's solution is sodium chlorid, 0.9 gm.; potassium chlorid, 0.042 gm.; calcium chlorid, 0.024gm.; sodium bicarbonate, 0.03 gm.; dextrose, 0.1 gm.; distilled water, q. s. ad. 100 c.c.

Brief Solution Table

(Using 5 grains to the ounce for a 1% solution or Note II)

For 1 : 1000 use dr.i to a gal., or mxv to 1 qt. ($\frac{1}{10}$%)
1 : 100 use dr.ii,mxl to 1 qt.
1 : 100 use dr.i,mxx to 1 pt.
1 : 50 use dr.v,mxx to 1 qt.
1 : 50 use dr.ii,mxl to 1 pt.
1 : 25 use dr.v,mxx to 1 pt.
1 : 20 use dr.xiii,mxx to 1 qt.

$\frac{1}{10}$ of 1%, or $\frac{1}{10}$% = 1 : 1000
$\frac{1}{5}$ of 1%, or $\frac{1}{5}$% = 1 : 500
$\frac{1}{2}$ of 1%, or $\frac{1}{2}$% = 1 : 200

1% = 1 : 100
2% = 2 : 100 or 1 : 50
3% = 3 : 100 or 1 : $33\frac{1}{3}$
4% = 4 : 100 or 1 : 25
5% = 5 : 100 or 1 : 20
10% = 10 : 100 or 1 : 10
20% = 20 : 100 or 1 : 5
25% = 25 : 100 or 1 : 4
50% = 50 : 100 or 1 : 2
100% = 100 : 100 or 1 : 1 (a pure drug or solution)

Rules for Solutions

Rule I. To make a weaker from a stronger solution.

Divide the strength desired (or the weaker solution) *by the strength you have* (or the stronger), and *then divide the amount wanted by the first result.*

First be sure that the two strengths you are working with are both in terms of proportion. For instance, if one strength is in % (per cent) and the other in proportion, as 1 : 20 or 1 : 1000, change the per cent to proportion. (See table, page 16.)

Examples

I. Given a 5% (or 1 : 20) solution of Carbolic Acid to make 3 quarts of a $\frac{1}{2}$% (or 1 : 200) solution. (Rule I.)

$$20\overline{)200}\quad 10$$

2 qts. ÷ 10 = 96 oz. ÷ 10 = $9\frac{6}{10}$ oz.
$\frac{6}{10}$ oz. × 8 = $4\frac{4}{5}$ drs. $\frac{4}{5}$ drs. × 60 = 48 m.
Ans. ℥ix, ℥iv, m.xlviii.

II. Given a 2% solution of Silver Nitrate to make a gallon of a 1 : 4000 solution. (Rule I.)

$$2\% = 1 : 50 \qquad 50)\overline{4000}\ 80$$

1 gal. = 4 qts. = 128 oz. = 1024 drs.

$$80)\overline{1024}\ (12 \text{ drs.} = \text{℥i, ℥iv}$$

$$\frac{80}{224}$$

$$\frac{160}{64}$$

$$\frac{64}{80} \times 60 = 48 \text{ m.}$$

Ans. ℥i, ℥iv, m.xlviii.

III. Given some pure drug. (Rule I.) (A pure drug equals 100% or 1 : 1.) For instance:

To make 2 quarts of a 1% solution of Acetic Acid.

1% = 1 part of Acetic Acid to 100 parts of water.

2 qts. = 64 oz. = 512 drs.

Since there is to be 1 part of Acetic Acid to 100 parts of water, we must give as many drachms of Acetic Acid as there are hundreds in 512 drachms, which is $5\frac{12}{100}$ drachms.

$\frac{12}{100}$ drachms × 60 = 7 m.

Ans. Use ℥v, m.vii of Acetic Acid for 2 qts. of 1% solution.

Another way of working out this problem is to use Note II.

5 grs. to the oz. is a 1% solution.
2 qts. = 64 oz.
64 × 5 grs. = 320 grs., or the amount necessary for 2 qts.
320 grs. = 5 drs. and 20 m.
(Divide by 60.)

(The difference in minims in the two methods is due to the fact that 5 grains to the ounce for a 1% solution is an approximate figure. Actually it should be 4.8 grains, but the 5 grains is close enough for all practical purposes.)

IV. Given a bottle of 95% Carbolic Acid. (Rule I.) (A pure drug equals 100% or 1 : 1. 95% Carbolic Acid is considered pure Carbolic because the 5% water is used to keep it in solution.)

To make 3 pts. of a 5% solution.
5% = 5 : 100 or 1 : 20.
3 pts. = 48 oz.

Since there is to be 1 part of Carbolic to every 20 parts of water, we must use as many ounces of Carbolic as there are twenties in 48 ounces, which is $2\frac{8}{20}$ ounces.

$\frac{8}{20} = \frac{2}{5} \times 8$ drs. $= \frac{16}{5} = 3\frac{1}{5}$ drs.
$\frac{1}{5} \times 60$ m. = 12 m.
Ans. ℥ii, ℥iii, m.xii.

This problem can also be solved by the second method used in Example III, using Note II.

For 1 ounce of a 1% solution we will need 5 grains.

For 1 ounce of a 5% solution we will need 25 grains.

For 3 pints or 48 ounces we will need 48 times 25, or 1200 grains or minims, which, divided by 60, equals 20 drachms.

20 drs. = 2 oz. and 4 drs.

Rule II. To estimate a dose of a different fractional part of a grain from the drug on hand.

Multiply the denominator of the fraction of the solution on hand by the number of minims containing it, and multiply the result by the dose you wish to give (or divide the result by the denominator of the fraction required).

Examples

V. If m.x = gr. $\frac{1}{30}$, how would you give gr. $\frac{1}{75}$?

If m.x = gr. $\frac{1}{30}$, m.i will contain $\frac{1}{10}$ of $\frac{1}{30}$, or $\frac{1}{300}$ of a grain.

It will then take 300 minims to contain 1 grain. It follows that if m. 300 contains 1 grain, $\frac{1}{75}$ of a grain will be contained in $\frac{1}{75}$ of 300, or 4 minims.

Ans. m.iv = gr. $\frac{1}{75}$.

VI. If m.x = gr. $\frac{1}{30}$, to give gr. $\frac{1}{200}$. (Rule II.)

$$200)300(1\tfrac{1}{2}$$
$$\underline{200}$$
$$100$$
$$\underline{200}$$

Ans. m.iss = gr. $\frac{1}{200}$.

How to give a fraction of a minim.

Double the dose, add an equal amount of sterile water, then give half of that whole amount.

To give m.iss, take m.iii, add m.iii of sterile water and of this 6 minims give 3 minims (m.iii).

VII. From a bottle of 15 grain tablets of Bichlorid of Mercury, how would you make 4 quarts of 1 : 10000 solution?

15 grains to 1 qt. is a 1 : 1000 solution (Note I).

4 × 15 grs. or 60 grs. to 4 qts. is still a 1 : 1000 solution.

1 : 10000 is 10 times weaker than a 1 : 1000 solution, therefore we need, for 4 qts. of a 1 : 10000 solution, $\frac{1}{10}$ of 60 grs., or 6 grs. The tablets are 15 grs. To obtain 6 grs., dissolve 1 tablet in 1 drachm of water and take $\frac{6}{15}$ of the drachm, or $\frac{6}{15}$ of 60 minims, which equals 24 minims.

If you have a capsule or tablet containing a larger dose than the dose ordered, dissolve it in water and give the required fraction of the solution.

For instance: Given a capsule containing 5 grains of Soda Bicarbonate to give 2 grains. Dissolve in water and give $\frac{2}{5}$ of the solution.

VIII. Given a solution of Camphor in Oil 20%, to give 5 grains.

20% = 20 : 100 or 1 : 5 or 1 gr. in 5 minims.

Therefore to give 5 grains take 25 minims.

SOLUTIONS, Continued

Lysol — A preparation of Cresol.

Used in 1 : 200 to 1 : 50 solutions for vaginal antisepsis.

Lime Water — Gastric sedative and antacid.

Prepared by dissolving unslaked lime in sterile water. Use $\frac{1}{4}$ lb. to 1 qt. of water. Allow to stand a few hours, then filter. Keep in a cool place, well corked.

Chlorid of Lime Solution — For disinfecting evacuations.

Use 1 lb. to 1 gal. of cold water. Mix in a wooden pail.

Potassium Permanganate — For antiseptic irrigations and for stomach washings.

Used in 1 : 500 to 1 : 5000 solutions for irrigations and stomach wash, and in 1 : 50 to 1 : 1000 solutions for gargles, sprays, etc.

Aluminum Acetate — For antiseptic dressings and infected wounds, etc.

Acetate of Lead	38 grs.
Alum	24 grs.
Water	1 qt.

Silver Nitrate — For antiseptic irrigations, washes, for conjunctivitis (especially ophthalmia neonatorum), etc.

Solutions from 1 : 10000 to 1 : 1000 or 1 : 50.

Argyrol (Silver Vitellin) — For antiseptic wash for inflammatory conditions, *e. g.*, chronic gonorrheal infections, conjunctivitis, ear infections, etc.
Solutions, 5 to 25%.

Protargol — Silver preparation similar to Argyrol in uses.
Solutions 1% up to 10%.

Tincture of Iodin — A solution of iodin in alcohol (containing 5% potassium iodid). A very efficient antiseptic.

Formalin — A solution of formaldehyde gas in water. Usually 40%.
Used in a 1 : 50 solution for disinfecting wounds and instruments, in a 1 : 25 solution for disinfecting stools, and a 1 : 400 solution for irrigating purposes.

For Fumigation.

Sufficient formaldehyde gas will be generated for 1000 cubic feet of air space by pouring over $6\frac{1}{2}$ oz. of potassium permanganate crystals, 1 pint of formalin (40%).

Peroxid of Hydrogen — For cleaning pus cavities and necrotic tissue. Oxygen is liberated and pus is destroyed. For pus cavities use pure. For gargle dilute $\frac{1}{2}$ to $\frac{1}{4}$. Keep in a cool place.

Bichlorid of Mercury — Efficient disinfectant, except for instruments, which it corrodes ; for white goods, which it discolors ; and for feces and sputum, which it does not disinfect on account of the albuminous

material and ammonia usually present in excreta, which decompose the drug.

Used in a 1 : 5000 solution for many antiseptic purposes, and in a 1 : 1000 for disinfecting.

Carbolic Acid or Phenol — Antiseptic and disinfectant. Pure carbolic requires about 5% of water or glycerin to keep it in solution. In making solutions hot water must be used, and the bottle must be shaken till all globules disappear, as they will burn any tissue with which they come in contact. Used in a 1 : 20 solution for disinfecting instruments, clothing, utensils and excreta, and in a 1 : 100 or 1 : 200 solution for antiseptic dressings.

Boracic Acid or Boric Acid — Antiseptic and soothing in dilute solutions. Saturated solution is 4%. Used in 1 : 50 solutions for eye and ear irrigations.

Carron Oil or Lime Liniment — Equal volumes of lime water and linseed oil. For local use, particularly for burns.

PART III

PRACTICAL CLASSIFICATION OF DRUGS

Drugs upon which emphasis has been laid are marked with a *

I. **Heart Stimulants**

* Digitalis, and several of its derivatives, such as Digitoxin, Digitalin, Digitalein, Digitophyllin, etc.

* Caffein Strychnin Camphor
Adrenalin * Strophanthus Squill

II. **Heart Depressants**

* Aconite Veratrum Colchicum

III. **Arteriole Constrictors**

* Adrenalin * Cocain (locally) Iron Salts (*e. g.*, Ferric Chlorid)
Caffein Digitalis

IV. **Arteriole Dilators**

* Amyl Nitrite Sodium Nitrite
* Nitroglycerin Sweet Spirits of Nitre

V. **Narcotics and Hypnotics**

a. Hydrocarbons

* Alcohol * Ether * Chloroform * Alcoholic Beverages * Chloral Chloralamid Sulphonal Trional * Veronal * Paraldehyd Hedonal Amylene Hydrate * Chloretone Urethane Neuronal Isopral

b. Alkaloidal Narcotics
* Opium and its derivatives, such as
* Morphin * Codein Laudanum * Paregoric
* Heroin * Hyoscin (Scopolamin)

c. Cannabis Indica

d. * Bromids

VI. **Respiratory Stimulants**
* Caffein * Strychnin * Atropin * Aromatic Spirits of Ammonia

VII. **Motor and Respiratory Depressants**
* Opium and its derivatives
Hydrocarbon hypnotics and narcotics

VIII. **Coal-Tar Products**

a. Antipyretics
* Acetanilid Pyramidon Salipyrin Salophen
* Antipyrin Malakin
* Phenacetin * Aspirin
These drugs not only reduce fever temperature but often are used as central analgesics.

b. Antiseptics
* Carbolic Acid * Lysol * Cresol Guaiacol
* Creosote * Salicylic Acid Picric Acid
Creolin * Salol * Benzoic Acid

IX. **Diuretics and Diaphoretics**
* Caffein * Digitalis * Calomel * Squill
* Pilocarpin * Ipecac (Dover's Powder) Aconite
Potassium Acetate Theocin Theophyllin
Agurin Potassium Citrate Scoparius Theobromin Diuretin Coal-Tar Antipyretics

X. **Internal Antiseptics**

* Quinin * Salvarsan * Mercury Emetin
* Atoxyl * Urotropin * Salicylates

XI. **Cathartics**

a. Laxatives and Aperients
b. Simple Purgatives
c. Drastic Purgatives
d. Saline Purgatives

XII. **Alteratives**

* Arsenic * Iron * Iodids

XIII. **Emetics**

* Apomorphin Tartar Emetic * Ipecac Alum
* Zinc Sulphate Ammonium Carbonate * Mustard
Copper Sulphate Sodium Chlorid

XIV. **Hematinics**

* Iron Arsenic

XV. **Intestinal Antiseptics: Anthelmintics**

* Salol * Thymol * Calomel Guaiacol Carbonate
Betanaphthol Quassia Santonin Aspidium
Granatum Pepo

XVI. **Intestinal Astringents**

* Tannic Acid Bismuth Subgallate
* Iron Salts Opium Alum

XVII. **Antispasmodics**

Asafetida Valerian

XVIII. **Acidifiers**

Dilute Acids

XIX. **Alkalinizers**
Dilute Alkalis

XX. **Local Anesthetics**
* Cocain Novacain Stovain Chloretone, etc.
Menthol Phenol * Ethylchlorid

PRACTICAL CLASSIFICATION OF DRUGS

(In Greater Detail)

I. **Heart Stimulants**

Digitalis

Source: The Purple Foxglove. Many different preparations on the market, *e.g.*, Digitoxin, Digitophyllin, Digitalin, Digitalein.

Action: Cardiac Stimulant, Diuretic, Gastrointestinal Irritant.
Is a sharp irritant subcutaneously (except certain preparations of digitalin). Has a direct stimulating effect upon the heart muscle. Increases force but usually lowers rate of heart-beat. Usually contracts some of the peripheral blood vessels. Increases urine flow, especially in dropsy, etc. Has accumulative effect. See under Arteriole Constrictors, p. 37.

Preparation and Dosage:
Extract of Digitalis, dose, 10 mgs. ($\frac{1}{6}$ gr.)
Fluid Extract of Digitalis, dose, 0.05 c.c. (1 min.)
Tincture of Digitalis, dose, .3 to 1 c.c. (5 to 15 mins.)
Infusion of Digitalis, dose, 8 c.c. (2 fl. drs.)

Symptoms of Overdosage:
Slow pulse, becoming rapid. Violent vomiting. Vertigo and pain. Dilated pupils and staring eyes. Diarrhea. Irregular, weak pulse. Rapid, feeble respiration. Delirium, stupor and convulsions. Final paralysis of the heart.

Antidote and Treatment:
Emetics and cathartics. Tannin in large quantities. Rest and quiet in a horizontal position. Ammonia, Brandy, Strychnin, Caffein and Atropin for stimulation. Digitalis is bitter, nauseating and may interfere with digestion. May also cause sleeplessness and fainting.

Caffein

Source: Coffee berries and tea leaves.

Action: Cardiac Stimulant, Cerebral Excitant and Diuretic.
Diminishes fatigue. Brightens the intellect. Probably stimulates the secreting cells of the kidney directly. See also under Respiratory Stimulants, p. 47.

Preparation and Dosage:
Caffein, dose, 0.05 to 0.3 gram (1 to 5 grs.)
Caffein Citrate, dose, 0.1 to 0.5 gram (2 to 8 grs.)
Caffein Citrate, Effervescent, dose, 4 grams (60 grs.)
Caffein and Sodium Benzoate, dose, 0.1 to 0.6 gram (2 to 10 grs.)
Caffein and Sodium Salicylate, dose, 0.1 to 0.6 gram (2 to 10 grs.)

Symptoms of Overdosage:
Caffein in toxic doses produces headache, restlessness, insomnia, giddiness, rapid feeble pulse, tremors, convulsive movements, great increase in the reflex excitability (like Strychnin) and finally profound, generalized convulsions, during which the respiration fails. In other cases the convulsions gradually become weaker and the patient dies from exhaustion.

Antidote and Treatment:
Empty stomach; give Tannic Acid and Aromatic Spirits of Ammonia for stimulation. For convulsions give a few whiffs of chloroform or ether.

Camphor

Source: Gum obtained from Camphor laurel.

Action: Heart Stimulant, Stomachic and Carminative, Diaphoretic and Expectorant.

Preparation and Dosage:
Aqua Camphora, dose, $\frac{1}{2}$ to 1 oz.
Spirits of Camphor, dose, 0.3 to 2 c.c. (5 to 30 mins.)
Camphorated Oil, dose, 0.3 to 0.6 gram (5 to 10 mins.)
Camphora Monobromata, dose, 0.13 gram (2 grs.) An allied product. (Used for its Bromin as a Nerve Sedative.)

Strychnin

Source: Alkaloid from Strychnos Nux Vomica, East Indian plant.

Action: Respiratory, Spinal, Cerebral and Vascular Stimulant. Stomachic. Externally and locally poisons vermin. Has bitter taste. Increases flow of saliva. Increases appetite. Acts through the central nervous system to stimulate the respiratory and vascular systems. May have accumulative effect.

Preparation and Dosage:
Extract of Nux Vomica, dose, 0.015 to 0.06 gram. ($\frac{1}{4}$ to 1 gr.)
Fluid Extract of Nux Vomica, dose, 0.05 c.c. (1 min.)
Tincture of Nux Vomica, dose, 0.3 to 1 c.c. (5 to 15 mins.)
Strychnin, dose, 0.001 to 0.002 gram ($\frac{1}{60}$ to $\frac{1}{30}$ gr.)
Strychnin Nitrate or Sulphate, dose, 0.001 to 0.002 gram ($\frac{1}{60}$ to $\frac{1}{30}$ gr.)
Sirup of Iron, Quinin and Strychnin Phosphate, dose, 4 to 8 c.c. (1 to 2 fl. drs.)

Symptoms of Overdosage:
Restlessness, nervousness, twitching of the fingers, etc. Reflex excitability is greatly increased. If dose is large enough, this rapidly leads to most profound generalized convulsions. These come on in spasms which last from a few seconds to two or three minutes. The patient then relaxes for a short time. In a little while the excitability of the cord increases to such an extent that a slight touch or sound may serve to start another convulsion. Rigidity. Opisthotonos (bending back of head, neck and shoulders and of legs and hips). Staring eyes, "Risus Sardonicus" (sardonic grin). Mind usually

clear except for asphyxia from lack of respiratory movements during convulsions. Death due to paralysis of respiratory center.

Antidotes and Treatment:
Tannic Acid (strong tea), emetics (Apomorphin, Zinc Sulphate). Lavage of stomach (Potassium Permanganate). Chloroform or Ether may be used to control convulsions. Catheterization. Quiet. Diuresis.
When giving Strychnin in any form, restlessness and twitching are always to be watched for. Strychnin poisoning is characterized by a series of spasmodic convulsions with intervals of quiet. Tetanus produces less severe but continuous spasm, which is especially developed in the jaw muscles.

Strophanthus

Source: Seeds of Strophanthus Kombé.

Action: Stimulates the heart muscle. Increases urine flow. Causes contraction of certain arterioles. Several preparations of "Strophanthin" are on the market. Used as a substitute for Digitalis.

Preparation and Dosage:
Extract of Strophanthus, dose, .015 to .06 gram ($\frac{1}{4}$ to 1 gr.)
Tincture of Strophanthus, dose, 0.3 to 1.0 c.c. (5 to 15 mins.)

Squill

Source: Bulb of lily family called Scilla.

Action: Stimulates the heart muscle. Increases urine flow. Used as a substitute for Digitalis. Also as an expectorant.

Preparation and Dosage:
Acetum Scillæ, dose, 1 to 2 c.c. (15 to 30 mins.)
Fluid Extract of Squill, dose, 0.05 to 0.1 c.c. (1 to 2 mins.)
Tincture of Squill, dose, 0.3 to 1 c.c. (5 to 15 mins.)
Sirup of Squill, dose, 2 to 4 c.c. (30 to 60 mins.)

Adrenalin (Epinephrin)

Source: Suprarenal glands of sheep, cattle, etc. Also made artificially.

Action: Vasoconstrictor and Hemostatic. When injected intravenously it stimulates the heart and also causes a profound contraction of the arterioles, which leads to a great rise in blood pressure. This rise lasts only for one or two minutes, after which the pressure falls again to its former level or below. Injected subcutaneously or intermuscularly it causes local hemostasis with, as a rule, no rise whatever of the blood pressure; but this mode of application leads to a marked dilatation of the bronchioles in spasms of bronchial asthma.
Applied locally to mucus membranes, etc., it causes local hemostasis and blanching of the tissues. Often added in small amount to solutions injected to produce local anesthesia, etc. It is of doubtful value in most cases of shock. It has no general effect when taken by mouth but may stop local hemorrhage.
See under Arteriole Constrictors, p. 36.

Preparation and Dosage:

Adrenalin Chlorid (1 : 1000 solution). May be injected subcutaneously in doses of $\frac{1}{2}$ to 1 c.c. for asthmatic attacks, or added in very small amount to solutions of Novocain, Cocain, etc., for local anesthesia. May be sprayed into nose or throat, etc., in dilute solution to check bleeding.

II. Heart Depressants

Aconite

Source: Root of European plant called Monkshood. Active principal is Aconitin, very powerful alkaloid. Dose, $\frac{1}{400}$ gr. (gr. $\frac{1}{20}$ fatal.)

Commercial preparations of Aconite vary greatly in their toxicity.

Action: Cardiac and Respiratory Sedative, Diaphoretic and Diuretic, Antipyretic. Dilates arteries and decreases pressure in febrile conditions. Externally and locally slightly absorbed. Parasiticide. Locally applied has some local analgesic power in such conditions as neuralgia, etc. Irritant to stomach and causes vomiting. Powerful cardiac poison. Reduces frequency and force of heart-beat by stimulation of cardio-inhibitory center in the medulla. Hence pressure falls. Certain arterioles are dilated (particularly those of skin). Hence temperature falls. Produces a gentle perspiration. Respirations become slower.

Preparation and Dosage:

Tincture of Aconite, dose, 0.6 c.c. (10 mins.)

Fluid Extract of Aconite, dose, 0.05 c.c. (1 min.)

Aconitin, 0.15 mg. ($\frac{1}{400}$ gr.)

Symptoms of Overdosage:
Tingling in mouth and skin. Constricted feeling in throat. Disorders of vision, staring eyes. Respiration very irregular and gasping. Pulse may fall to 30 or 40 per minute or become extremely irregular. Great muscular weakness and prostration. Suppressed voice. Mind usually clear except for asphyxia, which results from poor circulation and respiration and may cause convulsions. Death usually results from paralysis of the respiratory center.

Antidote and Treatment:
Emetics and lavage of stomach. Strong tea or coffee. Tannic Acid. External heat. Atropin and Aromatic Spirits of Ammonia. Rest, quiet.
Precautions: Pulse, respiration and temperature to be carefully watched. Guard against cold air and drafts. Allow no exertion.

Veratrum

Source: Roots of Hellebore, an American and European plant.

Action: General Depressant. Reduces the strength and frequency of the pulse, possibly lowering the rate to 35 or 40. Erratic heart action may result from poisonous dose. Vagus cardio-inhibitory center in the medulla is stimulated and the heart muscle is also directly affected.
Dilatation of cutaneous vessels and fall in temperature. Very similar to Aconite in action, but not so poisonous. Consciousness not affected by moderate

doses, but with poisonous doses may be lost from effects of poor circulation and respiration. Respiration slow, shallow and with large doses becomes irregular and gasping. Used empirically in eclampsia. Also rarely to reduce fever. Used locally as ointment or liniment for neuralgia.

Preparation and Dosage:
Veratrum Ointment, 4 %.
Veratrum Liniment, 2 %.
Veratrin, the free alkaloid and its salts, the sulphate, etc., dose, 2 mg. ($\frac{1}{30}$ gr.)
Fluid Extract of Veratrum, dose, 0.1 c.c. ($1\frac{1}{2}$ mins.)
Tincture of Veratrum, dose, 1 c.c. (15 mins.)

Symptoms of Overdosage:
Nausea and vomiting. Cold, clammy skin and thread-like pulse. Rarely fatal results, though symptoms are alarming, including faintness, loss of sight and great prostration and weakness.

Antidote and Treatment:
Emetics and lavage. Strong tea or coffee. External heat. Atropin and Aromatic Spirits of Ammonia. Rest and quiet.

Colchicum

Source: Meadow Saffron, roots or seed.

Action: Cardio-Respiratory Depressant and Irritant. In therapeutic doses has but little effect on the circulation or respiration, but in poisonous doses produces severe gastrointestinal irritation. This results in collapse, with great pain and prostration,

feeble, rapid, thread-like pulse, weak, shallow respiration. Moderate doses produce purgation. Its main use at present is empirically in the treatment of gout.

Preparation and Dosage:
Fluid Extract of Colchicum Seed (Fluid Extractum Colchici Seminis), dose, 0.2 c.c. (3 min.)
Tincture of Colchicum Seed, dose, 2 c.c. (30 mins.)
Wine of Colchicum Seed, dose, 2 c.c. (30 mins.)
Colchicin, alkaloid, dose, 0.5 mg. ($\frac{1}{120}$ gr.)

III. **Arteriole Constrictors**

Adrenalin (Epinephrin). See under Heart Stimulants, p. 32.

Applied locally either as a spray or ointment to mucus membranes or raw surfaces causes great contraction of muscular walls of small arterioles. This checks hemorrhage from small vessels, but does not appreciably affect bleeding from large vessels. Injected hypodermically (usually in great dilution in a local anesthetic solution) it produces vasoconstriction in the tissues reached.

Preparation and Dosage:
With anesthetic solutions in the strength of 1 : 10000 of Adrenalin Chlorid.
1 : 1000 solution may be used as spray in nose bleed, etc.
Adrenalin ointments, etc., are on the market now.

Cocain. See under Local Anesthetics, p. 77.

Solutions of cocain applied to mucus membranes or

other tissues where the drug may reach the finer blood vessels cause local vasoconstriction. This is one of the accompanying phenomena when cocain is used as a local anesthetic. Hemorrhage from operations on the eye or the throat, etc., may thus be much reduced by the local injection or application of cocain.

Preparation and Dosage:
Cocain Hydrochlorid, colorless crystals, soluble in water and alcohol. Watery solutions cannot be sterilized by boiling, as the alkaloid tends to decompose. Solutions of various strengths are used, *e. g.*, 1%, 2%, 4% or even 10% to 20%.

Caffein and Digitalis. See under Heart Stimulants, p. 27.

These drugs have some power to cause vasoconstriction when given by stomach or hypodermically. But the arteriole contraction may be limited to certain portions of the body, *e. g.*, parts of the splanchnic area, and no very well-defined therapeutic result can, as a rule, be predicted from this action of the drugs. Other drugs of the Digitalis series might be mentioned here also.

IV. Arteriole Dilators

Amyl Nitrite, Nitroglycerin, Sodium Nitrite and Sweet Spirits of Nitre

All of these drugs tend to cause a dilatation of the arterioles, with a consequent fall in blood pressure. Amyl Nitrite is volatile and a few drops are usually

poured on a cloth and inhaled like chloroform. The general blood pressure falls immediately. Small glass ampules or pearls containing from 5 to 10 minims of Amyl Nitrite are on the market. These ampules or pearls are broken on a cloth as needed. Nitroglycerin is generally given in tablets of $\frac{1}{100}$ gr. (These do not keep well.)

Preparation and Dosage:
Amyl Nitrite, dose, 2 to 5 drops on a handkerchief.
Spirits of Glonoin (Spiritus Glycerylis Nitratis), 1% of Nitroglycerin in alcoholic solution, dose, $\frac{1}{2}$ to 4 mins.
Sodium Nitrite, dose, .06 to 0.1 gram (1 to 2 grs.)
Sweet Spirits of Nitre, dose, 1 to 5 c.c. (20 to 90 mins.)

V. Narcotics and Hypnotics

a. Hydrocarbons

Alcohol

Source: Made by fermentation of substances containing grape sugar. A ferment, zymase, present in growing yeast is used in this process.

Action: Cerebrospinal Excitant, Cardiac and Gastric Stimulant, Antipyretic.
Primary stimulation of the central nervous system, followed by a depression. Best authorities consider primary effects not really stimulant but deceptive, and result of a depression of the higher controlling and inhibiting functions of the brain. Small doses act as a local stimulant to the gastric mucosa.

Marked effect on nervous system; deadens control of mind and moral sense. Large doses may lower temperature by dilation of the skin vessels. When excitement is produced the heart rate and respiration may be slightly accelerated, but this rapidly changes to depression and slowing as the dose is increased. Applied locally alcohol exercises a cooling sensation and also hardens and toughens the skin. Internally a sufficiently large dose causes depression and coma, ending in death from respiratory paralysis. After smaller doses recovery, accompanied by vomiting and great weakness and prostration, may take place in twelve to twenty-four or forty-eight hours. About 95% of the alcohol ingested is oxidized in the body. The remainder is slowly excreted. Small repeated doses of alcoholic beverages are sometimes given as a food in cases of prolonged fever, etc.

Alcoholic Preparations and Beverages

Absolute alcohol contains from $\frac{1}{2}$ to 1% of water.

Brandy (Spiritus Vini Gallici) is obtained from grape wine and contains about 45% of alcohol.

Whisky (Spiritus Frumenti) is obtained from certain starch-containing substances, as rye, corn, potatoes, etc., by distillation and contains 44 to 50% of alcohol.

Rum is obtained by distillation of fermented molasses and contains about 42% of alcohol.

Gin is grain spirits distilled with Juniper berries and contains about 45% of alcohol.

Red Wine (Vinum Rubrum) is obtained from the entire grape and contains from 7 to 12% of alcohol. Examples: Claret, Bordeaux and Port.

White Wine (Vinum Album) is obtained from the juice of grapes and contains 7 to 16% of alcohol. Examples: Sherry, Madeira and Catawba.

Champagne is a carbonated wine and contains 10 to 13% of alcohol.

Ale or Stout is obtained from barley and hops and contains 5 to 9% of alcohol.

Beer or Porter is also obtained from barley and hops and contains 2 to 5% of alcohol.

Kumyss, a fermented milk preparation, contains 1 to 3% of alcohol.

Ether

Source: A highly volatile, inflammable liquid produced by the action of strong sulphuric acid on ordinary alcohol.

Action: Anesthetic, Cardiac and Respiratory Depressant.

Applied locally (especially as a spray) its rapid evaporation may cause sufficient cold to act as a local anesthetic. A fat solvent. Bitter and irritating to the mouth and respiratory passages. May reflexly cause excitement and struggling, which in turn may accelerate the heart and respiration. Direct action on the heart and respiration is depress-

ant, the final cause of death being paralysis of the respiratory center. Most extensively used general anesthetic, given by inhalation. Excreted mainly by the lungs.

Recovery from Surgical Anesthesia:
Patients should be kept warm and out of drafts, fresh air should be abundant, vomitus or excessive mucus should be sponged out of the mouth (the head being turned to one side if necessary) and patient must be watched for surgical shock and collapse.

Hoffman's Anodyne (Compound Spirits of Ether). Carminative and Stimulant, dose, 10 mins. to 1 fl. dr.

Chloroform

Source: A volatile liquid formed by the action of chlorinated lime on methyl alcohol.

Action: Similar to ether but more depressant, especially on the heart and respiration. Less irritating to the air passages, non-inflammable, more agreeable to the patient. After effects more dangerous than those of ether, as a rule; the heart, kidney and liver being particularly liable to be injured by chloroform, while the lungs and respiratory passages may be affected by ether. Chloroform is given by inhalation. Also used in liniments.
A considerable number of other substances belonging to this class of drugs are used to produce sleep or to relieve pain or convulsions, excitement, etc. Among these may be mentioned:

Chloral Hydrate

Source: A crystalline solid formed by action of chlorin on alcohol, readily soluble in water, usually given in dilute solution in sirup. Dose, 0.5 to 2 grams (10 to 30 grs.)

Veronal, colorless crystals given in warm water or milk. Dose, 0.3 to 0.6 gram (5 to 10 grs.)

Chloretone, colorless crystals, slightly soluble in water, very soluble in alcohol, may be given in (1%) aqueous solution or, better, in tablets. Dose, 0.3 to 1 gram (5 to 15 grs.)

Chloralamid, white crystalline powder. Dose, 1 gram (15 grs.)

Paraldehyd, colorless fluid, strong characteristic odor and burning taste. Given in brandy and water, or in water (up to 10%) or in capsules. Dose, 1 to 4 c.c. (15 to 60 mins.)

Urethane, colorless crystals, very soluble in water, alcohol and ether. Dose, 1 gram (15 grs.) (may be increased)

Sulphonal, crystalline white powder. Given in powder or in hot water or milk. Dose, 1 gram (15 grs.)

Hedonal, crystalline powder. Given in powder or tablets. Dose, 2 grams (30 grs.)

Neuronal, bitter crystals. Given in powders or tablets, to be dissolved in warm water or milk. Dose, 0.5 to 2.0 grams (5 to 30 grs.)

Trional. Similar to sulphonal. Dose, 1 gram (15 grs.)

Amylene Hydrate, colorless liquid. May be prescribed in capsules or up to 10% in water flavored with licorice extract. Dose, 3 to 5 c.c. (40 to 80 mins.)

Isopral, white crystals, camphor odor, aromatic biting taste, soluble in 30 parts of water. Dose, 0.5 to 0.75 gram (5 to 8 grs.)

b. **Alkaloidal Narcotics**

Opium. (Morphin, Codein, Heroin, Laudanum, Paregoric)

Source: The juice obtained by incision of the unripe capsules of the opium Poppy. Opium itself is a brownish, gumlike substance, or else it may be reduced to a brownish powder. The pure alkaloids, Morphin, Codein, Heroin, etc., are white powders.

Action: Analgesic, Hypnotic, Myotic, Secretory Depressant. Allays peristalsis. Bitter taste. Sweetish narcotic odor.

Opium and its derivatives depress the central nervous system and cause sleep and insensibility to pain. Circulation is not much affected directly. Secretions, with exception of perspiration, are decreased. Respirations are slowed and usually become shallower. After large doses they become irregular (Cheyne-Stokes type).

Chronic poisoning may result from constant use of Opium or some of its derivatives (*e. g.*, Morphin habit).

Children and infants are extremely susceptible to these poisons, and the greatest possible care must be used in their administration to such patients. Death results from paralysis of respiratory center. Opium and Morphin are mainly excreted by intestines. Codein by urine. It is claimed that a nursing child may be affected through its mother's milk if she takes one of these drugs.

Preparation and Dosage:

Powdered Opium (Opii Pulvis), 12% of Morphin. Dose, 0.02 to 0.1 gram ($\frac{1}{3}$ to $1\frac{1}{2}$ grs.)

Extract of Opium, 20% of Morphin. Dose, 0.015 to 0.06 gram ($\frac{1}{4}$ to 1 gr.)

Laudanum (Tincture of Opium), 10% of Opium; 1.20 to 1.25% of Morphin. Dose, 0.3 to 1 c.c. (5 to 15 mins.) M.x equals 1 gr. of Opium, or $\frac{1}{8}$ gr. of Morphin.

Tincture of Deodorized Opium. Dose, 0.3 to 1 c.c. (5 to 15 mins.)

Black Drops (Acetum Opii). Dose, 0.3 to 1 c.c. (5 to 15 mins.)

Dover's Powders, 10% each of Opium and Ipecac and 80% of Sugar of Milk. Dose, 0.3 to 1 gram (5 to 15 grs.)

Paregoric (Camphorated Tincture of Opium). Dose for an adult, 4 to 15 c.c. (1 to 4 fl. drs.); for a child, 0.3 to 1 c.c. (5 to 15 drops) ($\frac{1}{2}$ oz. equals 1 gr. Opium)

Morphin, Morphin Hydrochlorid, Morphin Sulphate and Morphin Acetate. Dose of each, $\frac{1}{12}$ to $\frac{1}{2}$ gr. (much less for babies)

The salts are soluble in water.
Majendi's Solution of Morphin. Dose, m.v to x (m.xxx equals 1 gr. of Morphin)
Codein, Codein Phosphate, Codein Sulphate. Dose of each, $\frac{1}{4}$ to $\frac{1}{2}$ gr.
The salts are fairly soluble in water.

Symptoms of Overdosage:
Morphin, gr. $\frac{1}{2}$, and Opium, gr. iii, may produce death. Contracted pupils, drowsiness, deepening stupor, no response to external stimuli, skin moist and clammy, becoming cyanotic. Respirations slow, rate 4 to 6 a minute. Feeble pulse. Coma, pin-point pupils. Death from failure of respirations in 4 to 12 hours.

Treatment:
Evacuate stomach by tube if possible. Emetics. Destroy poison in stomach with Potassium Permanganate (1 : 2000). Give strong tea or coffee. Tannic Acid (contained in strong tea). Tannic Acid forms Morphin Tannate from the Morphin present in the stomach. Should be washed out, for the Hydrochloric Acid of the gastric juice may break down the tannate after a time and form the soluble Morphin Hydrochlorid which is readily absorbed. Keep patient awake. Give Aromatic Spirits of Ammonia, Strychnin or Atropin. Catheterize patient if necessary. Stomach should be repeatedly washed out with Potassium Permanganate (1 : 2000), for a part of the poison is excreted into the stomach and if not removed will be reabsorbed.

Hyoscin (Scopolamin)

Source: The alkaloid obtained from Hyoscyamus, Scopola, etc.

Action: Sedative and Hypnotic, especially in maniacal excitement, delirium tremens, etc. Mydriatic, Respiratory Stimulant, and in large doses paralyzes the vagus endings in the heart and secretory nerve endings in glands. Most Belladonna preparations contain Hyoscin, which is present in Atropa Belladonna. Hence Belladonna preparations often depress the central nervous system. This is due to the Hyoscin and not to the Atropin, as ordinarily taught. Depressant action somewhat resembles that of Codein.

See also Atropin, whose peripheral paralysis of nerve endings is practically identical with that of Hyoscin.

Preparation and Dosage:

Hyoscin Hydrobromid (identical with Scopolamin Hydrobromid), colorless, transparent crystals, acrid, bitter taste, very soluble in water. Dose, 0.0003 to 0.0005 gram, $\frac{1}{3}$ to $\frac{1}{2}$ milligram ($\frac{1}{200}$ to $\frac{1}{100}$ gr.)

c. **Cannabis Indica**

Source: Flowering tops of Cannabis Sativa or Indian Hemp.

Action: Hypnotic, often used instead of Morphin. Produces sleep in about 50% of cases. Does not disturb digestion; is safe; no subsequent nausea or depression; useful in sleeplessness from nervous exhaustion, less often from pain. Sometimes used for migraine and in mental diseases.

Preparation and Dosage:
Extract of Cannabis Indica, dose, 0.015 to 0.06 gram ($\frac{1}{4}$ to 1 gr.)
Fluid Extract of Cannabis Indica, dose, 0.1 to 0.3 c.c. (2 to 5 mins.)
Tincture of Cannabis Indica, dose, 1 to 2 c.c. (15 to 30 mins.)
Commercial preparations are often inert and should be carefully tested.

d. **Bromids**

Source: Bromin, a non-metallic element found in sea water and in the product of certain salt works.

Action: Depression of central nervous system. Hypnotic and Sedative. Used to produce sleep, to quiet nervous excitement in epilepsy, seasickness, etc.

Preparation and Dosage:
Sodium Bromid, Potassium Bromid and Ammonium Bromid are in general use. Dose, 0.6 to 1.0 grams (10 to 15 grs.)

VI. Respiratory Stimulants

Caffein

Source: Coffee berries and tea leaves.

Action: Stimulation of psychic areas, vasomotor and respiratory centers, stimulation of central nervous system in large doses; increased diuresis; decreased fatigue. See also under Heart Stimulants, p. 28.

Preparation and Dosage are given on p. 28.

Strychnin. See under Heart Stimulants, p. 29.

Atropin

Source: From Atropa Belladonna (Deadly Nightshade).

Action: Cardiac and Respiratory Stimulant, Secretory Depressant, Mydriatic, Cerebral Excitant (large doses)

Most important actions: 1. To stimulate respirations. 2. To relieve spasms of involuntary muscles, as from stones in gall bladder, cathartic gripes, lead colic, etc. 3. To dry secretions of stomach, nose, sweat glands, etc. Externally and locally some benumbing effects. (Belladonna plaster, ointment and liniment.) Commercial preparations often contain Hyoscin (Scopolamin), which tends to cause sleep. Atropin is often given before an anesthetic to check secretions in mouth, throat, etc. (and to prevent reflex inhibition of the heart with chloroform). Also used in asthma.

Symptoms of Overdosage:

Rash. Pupils bright and staring. Dry, flushed skin. Dry throat, with difficulty in swallowing. Headaches, illusions and delirium. Rapid pulse, out of proportion to respirations. Symptoms somewhat like scarlet fever, except for dilated pupils.

Antidote and Treatment:

Evacuate stomach and treat symptoms. Catheterize. Apply external heat. Artificial respiration. Give Tannic Acid and wash out stomach. Convulsions may be controlled by ether inhalations.

Preparation and Dosage:
Extract of Belladonna Leaves, dose, .3 to 1 c.c. (5 to 15 mins.)
Belladonna Ointment (0.14% of alkaloids)
Tincture of Belladonna Leaves (0.035% of alkaloids), dose, .3 to 1 c.c. (5 to 15 mins.)
Belladonna Liniment contains Camphor.

Stramonium (Thorn Apple or Jamestown Weed) and **Hyoscyamus** (Henbane) also contain Atropin, as well as varying quantities of Hyoscyamin and Hyoscin. See also under Alkaloidal Narcotics and Hypnotics, p. 46.

Ammonium Preparations

Source: From NH_4OH, by various substitutions.

Action: Stimulation of central nervous system, of respiratory center, etc.; increase of reflexes, of sweat center, etc.
Local expectorant action (this has been denied but is generally practiced). Used in many "cough mixtures." Used in asthma, edema of the lungs, pneumonia, in resuscitation from fainting, anesthesia, poisoning, etc.

Preparation and Dosage:
Ammonium Carbonate, dose, 0.12 to 1 gram (2 to 15 grs.), largely diluted.
Aromatic Spirits of Ammonia, dose, 2 to 4 c.c. ($\frac{1}{2}$ to 1 dr.) in a glass of water. Sugar may be added to improve the taste.

Ammonium Chlorid, dose, 0.06 to 2 grams (1 to 30 grs.)

Liquor Ammonium Acetate (Spiritus Mindereri), 2 to 30 c.c. (½ to 8 fl. drs.)

VII. Motor and Respiratory Depressants

Opium and its derivatives, Morphin, Codein, Heroin, etc. See under Alkaloidal Narcotics and Hypnotics, p. 43.

All of these bodies depress the respiratory center. They also lessen the movements and excitement of the patient, and thus indirectly lessen the respiratory rate. The Hydrocarbon Hypnotics and Narcotics also lessen the irritability of the respiratory center. For description see p. 38.

VIII. The Coal-Tar Products

a. Antipyretics

Source: Tar which is formed in the manufacture of illuminating gas from coal.

The Antipyretic Group are used chiefly to lower fever temperature. Their chemistry and action are, however, closely related to the **Antiseptic Group**, which is distinguished by a much more marked local action on protoplasm whereby bacteria and other living organisms are injured or killed.

Antipyretics cause a slight primary stimulation of the central nervous system, followed by more marked depression resulting in collapse, if the dose is large enough.

Lower fever temperature by action on heat regulat-

ing centers in brain. Central analgesic action (in headaches, etc.) Irritate or coagulate protoplasm when locally applied in sufficient concentration. Possess some local anesthetic power. The simpler members (chemically) are as a rule more easily broken down in the blood to form simple Phenol (Carbolic Acid) derivatives, and hence are more poisonous, *e. g.*, Acetanilid. Tendency to depression of heart and circulation in general. Skin vessels dilate and patient sweats, the fever thereby being lowered. Most proprietary "headache powders" or tablets contain one of these drugs, often Acetanilid, which is one of the most dangerous.

Preparation and Dosage:
Acetanilid (Antifebrin), dose, 0.06 to 0.3 gram (1 to 5 grs.)
Antipyrin, dose, 0.3 to 0.6 gram (5 to 10 grs.)
Phenacetin, dose, .3 to 1 gram (5 to 15 grs.)
Pyramidon, dose, 0.3 to 0.4 gram (5 to 6 grs.)
Malakin, dose, .5 to 1 gram (7 to 15 grs.)
Aspirin (Acidum Acetylsalicylicum), dose, 0.3 to 1 gram (5 to 15 grs.)

Salipyrin, dose, 0.3 to 2.0 grams (5 to 30 grs.)
Salophen, dose, 0.3 to 1 gram (5 to 15 grs.)
Rarely certain symptoms (idiosyncrasies) are produced by these drugs. Among these are skin eruptions, itching, fever, profuse sweating, shivering and rigors, catarrh and burning of throat and mouth, mental dullness, etc., collapse, cyanosis, weak heart, etc.

Symptoms of Overdosage:
Prostration; heart first rapid and feeble, then slow; convulsive movements; cold, clammy skin; subnormal temperature and finally death from failure of the circulation.

b. **Antiseptics** are characterized by a coagulating action on proteid which kills or injures cells, bacteria, etc., with which they come in contact and results in irritation and inflammation. Central nervous system is first stimulated then depressed. Skin becomes blue and urine dark (smoky). Poisoning is similar but much more severe than with the Antipyretics.

Preparation and Dosage:

Carbolic Acid (Phenol), colorless or reddish crystals. Soluble in 20 parts of water.
Ointment, 3% in white petrolatum.
Glycerite, a 20% solution in glycerin.
Dobell's Solution (0.3% of phenol), see p. 85.

Creosote, oily liquid, smoky odor, dose, 0.05 to 0.3 c.c. (1 to 5 mins.)

Creosote Carbonate, dose, 15 grains.

Creolin and Lysol, proprietary disinfecting solutions.

Guaiacol, colorless crystals, or fluid, agreeable aromatic odor, soluble in 53 parts water and in alcohol. Dose, 0.5 c.c. (8 mins.)

Guaiacol Carbonate, almost tasteless powder, dose, 0.2 to 0.5 gram (3 to 8 grains)

Ichthyol and Tar, used in ointments, etc.

Salicylic Acid, generally prepared from Phenol, but also derived from Salicin or the natural salicylates, Oil of Wintergreen (Gaultheria) or Sweet Birch. Antiseptic, Antipyretic and Germicide, Cholagogue and Intestinal Antiseptic. Overdosage produces buzzing and roaring in the ears, disturbance of vision, excessive sweating, delirium, cardiac and respiratory depression. Used in rheumatism, etc. Dose, Sodium Salicylate, 0.3 to 2 grams (5 to 30 grains)

Salol. Intestinal antiseptic, splits up into Salicylic Acid and Phenol in the alimentary canal. Dose, .06 to 0.6 gram (1 to 10 grains)

Oil of Wintergreen (Methyl Salicylate, Oleum Gaultheria), dose, 1 c.c. (15 mins.)

Salicin, dose, .5 to 2 grams (8 to 30 grains)

Mesotan, a preparation of Salicylic Acid, with the properties of a volatile oil. More irritant than Methyl Salicylate.

Benzoic Acid, dose, .3 to 1 gram (5 to 15 grains)

Sodium Benzoate, dose, 0.3 to 2 grams (5 to 30 grains)

Compound Tincture of Benzoin, dose, 2 to 8 c.c. (30 mins. to 2 fl. drs.) Often used externally.

Balsam of Peru, dose, 1 c.c. (15 mins.). Often used externally.

Balsam of Tolu, dose, 0.3 to 1 gram (5 to 15 grains)

Cresol, straw-colored fluid, phenol odor, soluble in 60 parts water, dose, 0.05 c.c. (1 min.)

Liquor Cresolis Compositus. Cresol, 50%, suspended in water by means of soap, used in diluted form as a surgical disinfectant.

Picric Acid, used as a local application for burns, erysipelas, etc.

IX. Diuretics and Diaphoretics

Caffein, Digitalis, Squill. See under Heart Stimulants (1), p. 27.

Calomel, Mercurous Chlorid (Hydrargyri Chloridum Mite, Hg_2Cl_2 or HgCl) is a bland, heavy powder, insoluble in water. Used extensively as a cathartic, especially in fermentative conditions of the stomach and bowels and auto-intoxication. Mild antiseptic action in the bowels. Does not increase the flow of bile as formerly believed, but the increased peristalsis may move forward more quickly than normal the bile which is poured into the intestines. Hence the stools may be greenish (from unchanged biliverdin). A saline cathartic is often given about eight hours after a dose of Calomel to flush out the bowels. Calomel also acts as a diuretic, especially in dropsy. Calomel is sometimes used in the treatment of syphilis, but other salts of mercury are better.

Dosage: Hydrargyri Chloridum Mite, 0.03 to 0.3 gram ($\frac{1}{2}$ to 5 grains), but often several doses of $\frac{1}{10}$ gr. each are given.

Chronic poisoning may result from use of mercury in any form. The symptoms are salivation and stomatitis, diarrhea and digestive troubles, anorexia, cachexia, skin eruptions, tremor, etc.

Potassium Acetate and Citrate. These salts increase the urine flow and also render it alkaline. Dose of each, 2 grams (30 grains)

Scoparius, the broom plant. Contains two bodies, Spartein and Scoparin. The latter is credited with some diuretic powers. Large draughts of the tea or infusion made from the entire plant may cause diuresis, but this probably is due mainly to the water ingested.

Preparation and Dosage:
Infusion of Scoparius, dose, 1 to 2 fl. oz.
Spartein Sulphate, dose, 0.004 to 0.8 gram ($\frac{1}{16}$ to 12 grs.) in 24 hours. Doses of 0.1 gram (2 grs.) are safe. Some authorities say the drug is practically useless in therapeutics.

Theocin, Theobromin, Diuretin, Agurin, Theophyllin

All of these bodies are diuretics which stimulate the secretory cells of the kidney directly. They are all related chemically and pharmacologically to Caffein. See p. 28. They do not, however, possess so extensive an action on the central nervous system as does Caffein. Theobromin occurs in chocolate, Theocin in tea leaves (in minute quantities).

Preparation and Dosage:

Theobromin, dose, 0.5 gram (8 grs.) three times a day.

Diuretin (Sodium-theobromin-salicylate) is more soluble. Dose, 0.5 to 1 gram (8 to 15 grs.) three times a day.

Agurin (Sodium-theobromin-acetate) is similar to Diuretin. Dose, 0.5 to 1 gram (8 to 15 grs.) three times a day.

Theocin is an artificial Theophyllin. Dose, 0.2 to 0.3 gram (3 to 5 grs.)

Pilocarpin

Source: Pilocarpus Jaborandi. This alkaloid increases most of the secretions. It also stimulates the endings of the vagus inhibitory nerves in the heart and may thus slow the beat, especially in poisoning. The medicinal dose is, however, usually too small to slow the heart. Used especially to increase sweat.

Preparation and Dosage:

Pilocarpin Hydrochlorid, dose, 0.003 to 0.03 gram ($\frac{1}{20}$ to $\frac{1}{2}$ grs.)

Pilocarpin Nitrate, dose, 0.003 to 0.03 gram ($\frac{1}{20}$ to $\frac{1}{2}$ grs.)

Ipecac

Source: Root of a Brazilian plant.

Action: Emetic, Expectorant (not as depressant, as Tartar Emetic), increases and makes more fluid the secretion of the bronchial mucus membrane. Dover's Powder is often used for cough as well as a diapho-

retic, and in chills, and in commencing catarrh of the respiratory passages. Ipecac has been used extensively in dysentery, especially amebic, in which it seems almost specific. The chief active principle of Ipecac is Emetin. In the last few years this drug has been given, with apparently marked success, hypodermically in the treatment of amebic dysentery. From $\frac{1}{2}$ to $\frac{3}{4}$ grain is given daily or every other day. From three to five doses have thus been found sufficient by some to stop the disease, but often much more is required.

Preparation and Dosage:
Sirup of Ipecac, dose, Expectorant, 1 c.c. (15 mins.); Emetic, 15 c.c. (4 fl. drs.)
Wine of Ipecac, dose, Expectorant, 1 c.c. (15 mins.); Emetic, 15 c.c. (4 fl. drs.)
Tincture of Ipecac and Opium (contains 10% opium), dose, 0.5 c.c. (8 mins.)
Dover's Powder (Pulvis Ipecacuanhæ et Opii, 10% each of Ipecac and Opium), dose, 0.5 gram (8 grs.)
Emetin Hydrochlorid, Expectorant, dose, 0.005 to 0.01 gram ($\frac{1}{12}$ to $\frac{1}{6}$ gr.); hypodermically, $\frac{1}{2}$ grain to $\frac{3}{4}$ for amebic dysentery.

Aconite. See under Heart Depressants, p. 33. Aconite produces a gentle perspiration.

Antipyretics

Most of the Coal-Tar Antipyretics cause perspiration when given to reduce fever. See under Coal-Tar Antipyretics, p. 50.

X. Internal Antiseptics

Quinin

Source: The bark of Cinchona Calisaya, etc.

Action: Quinin in sufficient quantities acts as a poison to all living protoplasm. It will also inhibit the actions of ferments. The general metabolism of the body is affected in such a manner as to lessen the amount of heat production and consequently a fever temperature may be lowered. (Antipyretic action.) Quinin exercises a selective toxic action on the malaria organism, which is killed in the blood of the patient by quantities of the drug which are harmless to the patient. The central nervous system under small doses undergoes some slight indefinite stimulation which is followed by depression as the dose is increased.

Quinin is chiefly used for its specific action in malaria. It is also often prescribed in neuralgia and headaches, colds, and as a bitter stomachic.

Symptoms of Overdosage:

Headache, ringing in the ears and disturbed vision. This complex symptom is known as cinchonism. Skin eruptions also sometimes occur. Idiosyncrasies occasionally develop under the use of quinin. Quinin is also used as an ecbolic and as a bitter stomachic.

Preparation and Dosage:

Tincture of Cinchona, 4 c.c. (1 fl. gr.)

The salts (sulphate, bisulphate, hydrobromid, hydrochlorid and salicylate) of Quinin, 0.3 to 1 gram (5 to 15 grs.)

Sirup of Iron, Quinin and Strychnin Phosphate, 4 c.c. (1 fl. dr.)
Elixir of Iron, Quinin and Strychnin Phosphate, 4 c.c. (1 fl. dr.)

Salvarsan ("**606**") and **Atoxyl**
These are both Arsenic compounds.
Neosalvarsan is a soluble modification (sodium salt) of Salvarsan. Both Salvarsan and Neosalvarsan are used in the treatment of syphilis.
Dose of Salvarsan: From 0.3 to 0.6 gram (5 to 9 grs.)
Neosalvarsan: For men, 0.6 to 0.9 gram (9.5 to 14 grs.); for women, 0.45 to 0.75 gram (7 to 12 grs.); for children, 0.15 to 0.3 gram (2 to 5 grs.)
Solutions of Neosalvarsan must be injected immediately after their preparation. Freshly distilled water should be used. Neosalvarsan solution must not be warmed and the temperature of the injection fluid should not be more than 20 to 22° C. (68 to 71.6° F.)
Salvarsan should be employed with the greatest caution, if at all, in the presence of eye disease, even when this is caused by syphilis.
Atoxyl is a sodium arsanilate containing about 26% of arsenic. It is used chiefly in Trypanosomiasis (Sleeping Sickness), and in other protozoal diseases, also in anemia, nervous diseases, skin affections, etc. Used with great caution in the presence of eye trouble. Dose, hypodermic tablets of 0.02 gram ($\frac{1}{3}$ grain) each.

Mercury. See also section under Calomel, p. 54. Mercury is used in the treatment of syphilis, especially in the active stages, often combined with Iodids or Salvarsan or Neosalvarsan. Mercury here acts by killing the Spirochæte Pallidum, the organism of syphilis. In the treatment of this disease Mercury in some of its forms may be given by mouth, by inunction, by hypodermic or intramuscular injection, etc. Mercury is also used as a purgative, as a diuretic, as an external disinfectant, in skin diseases, etc. Bichlorid of Mercury is often taken with suicidal intent.

In acute poisoning the stomach should be emptied, preferably by the tube. Tannic acid, eggs, milk or other albuminous substances may be given to precipitate the metal. The stomach should be emptied after these to prevent the later absorption of the Mercury. The later treatment is symptomatic. In chronic poisoning the mouth should be kept well cleansed. The diarrhea may be checked by opium.

Preparation and Dosage:

Bichlorid of Mercury (Hydrargyri Chloridum Corrosivum, Corrosive Sublimate, Mercuric Chlorid, $HgCl_2$) is often used in dilute solution as a disinfectant (1 in 2000 to 4000). Death has resulted from taking 3 grains. Dose, 2 to 4 milligrams ($\frac{1}{32}$ to $\frac{1}{16}$ gr.)

Red Iodid of Mercury, Biniodid of Mercury (Hydrargyri Iodidum Rubrum, HgI_2). Dose, 2 to 4 milligrams ($\frac{1}{32}$ to $\frac{1}{16}$ gr.)

Donovan's Solution (Liquor Arseni et Hydrargyri Iodidi) contains 1% each of Arsenic, Iodid and Red Mercuric Iodid. Dose, 0.05 to 0.5 c.c. (1 to 8 mins.)

Calomel (Mercurous Chlorid, HgCl, Hydrargyri Chloridum Mite). Dose, 0.03 to 0.3 gram ($\frac{1}{2}$ to 5 grs.), but often $\frac{1}{10}$ gr. is given in repeated doses, if desired.

Mercury with chalk, Gray Powder (Hydrargyri cum Creta). Dose, 0.1 to 0.5 gram (2 to 8 grs.)

Blue Mass, Blue Pill (Massa Hydrargyri), 33% Mercury. Dose, 0.25 gram (4 grs.)

Blue Ointment (Unguentum Hydrargyri), 50% Mercury.

Unguentum Hydrargyri Dilutum, $33\frac{1}{3}$% Mercury.

Unguentum Hydrargyri Ammoniati, 10% Mercury.

Salicylates. See under Coal-Tar Antiseptics, p. 53. The Salicylates are used regularly in the treatment of rheumatism, and often (mixed with collodion and Tincture of Hyoscyamus, etc.) to remove corns, etc.

Mesotan has been used as a substitute for Oil of Wintergreen (Gaultheria).

Urotropin. This drug is used extensively as a urinary disinfectant. It has also been recommended in gall-bladder infections, in pyelitis, in colds and meningeal infections. Its antiseptic action depends on its power to break down with the liberation of formaldehyd. This readily occurs in acid solutions, but only slowly and imperfectly in neutral or faintly

alkaline solutions. Hence its use in many infectious conditions has been much discussed recently. Its greatest value appears to lie in its antiseptic action in acid urine. Dose, 0.2 to 0.6 gram (3 to 10 grs.), to be taken in a glass of water.

Emetin. This drug (from Ipecac) has been used extensively both hypodermically and by stomach in the treatment of amebic dysentery. See under Diuretics and Diaphoretics, p. 57.

XI. Cathartics

a. Laxatives and Aperients (mild drugs which simply serve to hasten intestinal evacuation).

Olive Oil. Dose, 30 c.c. (1 oz.) or more.

Sulphur, Magnesia, Euonymus, Butternut, Tamarind, etc.

b. Simple Purgatives (produce active peristalsis and griping pain. Small doses may act as laxatives only).

Aloes (Aloe Purificata), dose, 0.06 to 0.6 gram (1 to 10 grs.)

Rhubarb (Extractum Rhei), dose 0.3 to 0.65 gram (5 to 10 grs.)

Senna (Fluidextractum Sennæ), dose, 4 to 8 c.c. (1 to 2 fl. dr.)

Black Draft (Infusum Sennæ Compositum), dose, 30 to 120 c.c. (1 to 4 fl. dr.)

Castor Oil (Oleum Ricini), dose, child, 4 to 8 c.c. (1 to 2 dr.); adult, 15 to 30 c.c. ($\frac{1}{2}$ to 1 oz.)

Calomel (Hydrargyri Chloridum Mite), dose, 0.006 to 0.65 gram ($\frac{1}{10}$ to 10 grs.)

Blue Mass, dose, 0.016 to 1.0 gram ($\frac{1}{4}$ to 15 grs.)
Cascara Sagrada (Rhamnus Purshiana), Fluid Extract, dose, 0.6 to 2.0 c.c. (10 to 30 mins.) Often Aromatic.

c. Drastic Purgatives (produce intense action, watery stools and much pain).
Croton Oil (Oleum Tiglii), dose, 0.03 to 0.12 c.c. ($\frac{1}{2}$ to 2 mins.)
Colocynthis (Extractum Colocynthidis), dose, 0.13 to 0.3 gram (2 to 5 grs.)
Compound Cathartic Pills (Pilulæ Catharticæ Compositæ), dose, 1 to 3 pills.
Vegetable Cathartic Pills (Pilulæ Catharticæ Vegetabiles), dose, 1 to 3 pills.
Gamboge (Pilulæ Catharticæ Compositæ), dose, 1 to 3 pills.
Podophyllum (Resina Podophylli), dose, 0.008 to 0.03 gram ($\frac{1}{8}$ to $\frac{1}{2}$ gr.)
Fluidextractum Podophylli, dose, 0.3 to 1.2 c.c. (5 to 20 mins.)
Jalap (Resina Jalapæ), dose, 0.065 to 0.3 gram (1 to 5 grs.)
Elaterium (Elaterinum), dose, 0.002 to 0.0065 gram ($\frac{1}{30}$ to $\frac{1}{10}$ gr.)

d. Saline Purgatives (produce copious, watery stools and give rise to but slight irritation).
Epsom Salt (Magnesii Sulphas), dose, 4 to 30 grams (1 to 8 drs.)
Glauber's Salt (Sodii Sulphas), dose, 8 to 30 grams (2 to 8 drs.)

Rochelle Salt (Potassii et Sodii Tartras), dose, 4 to 16 grams (1 to 4 drs.)
Sodium Phosphate (Sodii Phosphas), dose, for child, 0.065 to 0.65 gram (1 to 10 grs.); for adult, 2 to 16 grams ($\frac{1}{2}$ to 4 drs.)
Magnesium Citrate (Magnesii Citras, Liquor Magnesii Citratis), dose, 180 to 360 c.c. (6 to 12 fl. oz.)

XII. Alteratives

Arsenic

Source: A metal that occurs in combination with many minerals. See also Salvarsan, Neosalvarsan and Atoxyl, under Internal Antiseptics, p. 59. Arsenic is used in diseases characterized by cachexia, anemia, wasting, malnutrition, etc. The pathology of these diseases is often unknown and the nature of the action of the drug is still more obscure. It is given in the belief that it will tone up the system, increase the appetite, counteract the anemia and improve the general nutrition. Often the drug does appear to cause considerable improvement. It is frequently given with iron. Various forms of Arsenic have been used widely in protozoal diseases, such as Trypanosomiasis (Sleeping Sickness), Syphilis, etc. In Pernicious Anemia it often produces temporary improvement. Many forms of skin diseases are treated with Arsenic, often with excellent results.

Preparation and Dosage:
Fowler's Solution (Liquor Potassii Arsenitis) contains 1% of Arsenous Acid neutralized with Bicar-

bonate of Potash, and is colored and flavored by addition of Compound Tincture of Lavender. Dose, 0.05 to 0.5 c.c. (1 to 8 mins.), or 3 to 5 drops three times daily, after meals.

Pearson's Solution (Liquor Sodii Arsenitis), 1% of Sodium Arsenate, dose, 0.05 to 0.5 c.c. (1 to 8 mins.)

Donovan's Solution (Liquor Arseni et Hydrargyri Iodidi), 1% of Arsenic Iodid and 1% of Red Mercuric Iodid. Clear, yellowish solution, harsh, metallic taste. Dose, 0.05 to 0.5 c.c. (1 to 8 mins.)

Soamin, Arsacetin and Arsenophenylglycin are recently introduced arsenic compounds.

Symptoms of Overdosage:

Itching and edema of the eyelids, nausea and diarrhea, skin eruptions, a feeling of constriction in the throat, etc. Large doses produce severe gastrointestinal irritation, pain in the abdomen, collapse, weakness, cramps in the muscles and limbs, profuse watery (rice water) stools, later containing blood and mucus. The symptoms closely resemble those of cholera.

Antidote and Treatment:

Lavage and emetics. The well-known "Arsenic Antidote" (Ferri Hydroxidum cum Magnesii Oxido) should always be kept on hand in hospitals and drug stores. The dose of this is 120 c.c. (4 fl. oz.). Lavage should be continued for some time. Magnesia alone may be given, or eggs, milk, etc. But the main reliance should be placed in thorough, repeated washing out of the stomach. Stimulants (Caffein, Digitalis), warmth, etc., should be administered. In

chronic poisoning a peripheral neuritis may result in paralysis of certain groups of muscles. These may be treated by the galvanic current, massage, etc.

Iron (Ferrum)

General Tonic and Stomachic. Increases the appetite and tends to aid in the formation of new hemoglobin, in building up the blood in anemia. It is most frequently used in the treatment of chlorosis. Cases of pernicious anemia may show some temporary improvement under Iron. Cases of general malnutrition, cachexia, anemia and wasting such as are often found in chronic diseases are often helped by Iron. It is also used as an astringent and a styptic. This depends on its power to coagulate albumen.

Preparation and Dosage:
Tincture of Ferric Chlorid, dose, 0.5 c.c. (8 mins.)
Reduced Iron (Ferrum Reductum), dose, 0.05 to 0.3 gram (1 to 5 grs.)
Blaud's Pills (Pilulæ Ferri Carbonatis), dose, 2 pills.
Sirup of Iron, Quinin and Strychnin Phosphate, dose, 2 to 4 c.c. (½ to 1 fl. dr.)
Elixir of Iron, Quinin and Strychnin Phosphate, dose, 4 c.c. (1 fl. dr.)
Iron and Potassium Tartrate (Ferri et Potassii Tartras) (15% of Iron), dose, 0.25 gram (4 grs.)
Basham's Mixture (Liquor Ferri et Ammonii Acetatis), dose, 16 c.c. (4 fl. drs.)
Most iron preparations produce constipation and cathartics have often to be taken with them. The stools may be dark-colored from the formation of

iron sulphid in the intestine. Many Protein Compounds of Iron have been put on the market, as the Albuminate or Peptonate, etc. On the whole these new compounds can scarcely be considered as superior to the older preparations and may often be inferior.

Iodids

Derived from Iodin, a non-metallic element found in seaweeds, some fresh-water plants, also in sponge, oysters, eggs, rock salt and several ores. Iodids are widely used in the treatment of tertiary syphilis. Other conditions, such as arteriosclerosis, aneurism, some forms of goitre, obesity, some skin eruptions, lymphatic enlargements, high blood pressure, some forms of cough, etc., have been treated with Iodids; but the results are usually doubtful, and in no case is it possible to tell how the drug acts in a given condition unless the patient be suffering from some (perhaps obscure) form of syphilitic lesion. Iodids are usually contraindicated in pulmonary tuberculosis because they may excite the lesion to renewed activity. Iodids are also used in the treatment of actinomycosis.

Large quantities of Iodids may cause a form of chronic poisoning known as Iodism. The symptoms of this are catarrh, redness, swelling and discomfort of the mucosa of the nose, throat, pharynx, larynx, etc. There is a profuse watery secretion, with much sneezing. The conjunctiva and frontal sinuses often become involved. There may be marked salivation

and involvement of the tonsils and possibly nausea and gastric discomfort. Skin eruptions of various forms often appear. It has been claimed that small doses are more liable to cause these skin lesions than large ones.

Preparation and Dosage:

Potassium Iodid ("KI"), dose, 0.1 to 1.3 grams (2 to 20 grs.) This is usually given in a saturated aqueous solution in gradually increasing doses up to the limit of tolerance.

Sodium Iodid (NaI), dose, 0.1 to 1.3 grams (2 to 20 grs.)

Iodoform, antiseptic dusting powder, often impregnated into antiseptic gauze dressings, slowly soluble in the tissue fluids.

Aristol (Thymol Iodid). A substitute for Iodoform.

Acidum Hydriodicum Dilutum, 10%, dose, 0.5 c.c. (8 mins.)

Iodin itself, in the form of the tincture (7%), is generally used as a local caustic or antiseptic, especially for the skin in surgical operations.

Lugol's Solution (Liquor Iodi Compositus) contains 5% Iodin dissolved in 10% Potassium Iodid solution. Dose, 0.2 c.c. (3 mins.)

XIII. Emetics

Apomorphin stimulates the vomiting center in the medulla. In large doses (therapeutic) it causes prompt emesis if the center has not been too much depressed, as by Chloral, Chloroform, etc. By small

doses, only the secondary symptoms of vomiting are produced without actual emesis. These lead to an increase of certain of the secretions, which action has been utilized in some respiratory troubles to increase and thin the secretions from the respiratory passages. These conditions are often better remedied by Ipecac or Antimony, which act for a longer time than Apomorphin.

Dosage:
Apomorphin Hydrochlorid, 3 to 6 milligrams ($\frac{1}{20}$ to $\frac{1}{10}$ gr.)

Ipecac. See under Diuretics and Diaphoretics, p. 56.
Has been used extensively as an emetic, which action appears to depend on a local irritation of the sensory nerve endings in the gastric mucosa. Small quantities are also frequently used in expectorant mixtures. Other uses and dosage have already been given. See p. 57.

Tartar Emetic

Occasionally used as an emetic. It also has a limited use in expectorant mixtures. It has been used rather extensively in the treatment of Trypanosomiasis (Sleeping Sickness), being given either by mouth, intravenously or hypodermically. When given by the latter method, however, it is very prone to cause abscess formation.

Dosage:
Tartar Emetic (Antimonii et Potassii Tartras) as a

diaphoretic, dose, 0.002 to 0.008 gram ($\frac{1}{30}$ to $\frac{1}{8}$ gr.); as an emetic, 0.03 to 0.1 gram ($\frac{1}{2}$ to 2 grs.)
Tartar Emetic, also contained in the Compound Sirup of Squill, is often used in the treatment of cough.

Ammonium Carbonate, Copper Sulphate, Mustard, Alum, Sodium Chlorid (salt) **and Zinc Sulphate.** These substances cause vomiting by reason of the reflexes set up from their local irritant action on the mucus membrane of the stomach.

Preparation and Dosage:

Copper Sulphate, Blue Stone (Cupri Sulphas), dose, as an emetic, 0.3 to 0.6 gram (5 to 10 grs.) This should be given in 1% aqueous solution. This is also the chemical antidote for phosphorus poisoning, for the copper is deposited on the particles of phosphorus and prevents their absorption. Copper sulphate is also used as an astringent in gonorrhea, on ulcers, in the treatment of certain eye diseases, etc.

Ammonium Carbonate. See also under Respiratory Stimulants, p. 49. Ammonium Carbonate is used as an emetic in the dose of 2 grams (30 grs.)

Mustard. Mustard and warm water is often a convenient emetic in case of poisoning, dose, 1 drachm+.

Alum, dose, 0.3 to 2 grams (5 to 30 grs.)

Sodium Chlorid (salt), dose, a teaspoonful or more in half a glass of warm water.

Zinc Sulphate, dose, 0.6 to 2 grams (10 to 30 grs.)

XIV. Hematinics

Iron. Regularly given in certain forms of anemia. It is believed to assist directly in the formation of new hemoglobin, which contains iron. For preparation and dosage, see under Alteratives, p. 66.

Arsenic. This element does not enter into the composition of normal blood (as does iron), but on account of its beneficial action on the nutritive processes of the body it is frequently given in anemic or cachectic conditions. For preparation and dosage, see under Alteratives, p. 64.

XV. Intestinal Antiseptics, Anthelmintics

Salol (Phenol Salicylate). Decomposes in the alkaline contents of the intestine, liberating Carbolic Acid (Phenol) and Salicylic Acid. It has been claimed to lessen intestinal putrefaction. Dose, 0.3 to 2 grams (5 to 30 grs.)

Betanaphthol, dose, 0.25 gram (4 grs.)

Guaiacol Carbonate, dose, 0.2 to 0.5 gram (3 to 8 grs.) Also given in pulmonary tuberculosis.

Calomel. See under Diuretics and Diaphoretics, p. 54.

Thymol, used extensively in the treatment of Anchylostomiasis or Uncinaria (hookworm). Given in emulsion or capsules. Dose, 2 grams (30 grs.) Repeated in two hours and followed six and eight hours later by a brisk saline purge.

Quassia. An infusion (10%) of Quassia is used as an enema for round worms in children.

Santonin. Used as a remedy against Ascaris Lumbricoides (Roundworms). Dose (Trochisci Santonini), 0.03 gram ($\frac{1}{2}$ gr.) A purge should be given before the Santonin and again two to four hours after to remove the benumbed parasites.

Aspidium (Male Fern). This drug is effective against tapeworms and the Anchylostomum Duodenale. Dose, Oleoresina Aspidii, 2 to 8 c.c. ($\frac{1}{2}$ to 2 fl. drs.) A light diet for one or two days followed by a purge should precede the administration of the drug. A second purge should be given six to twelve hours after the drug. Castor oil or other oily substances should not be taken near the time the drug is given, as these tend to dissolve the poison and to promote its absorption.

Granatum (Pomegranate Bark), used especially against tapeworms. Dose, Fluid Extract of Granatum, 2 c.c. (30 mins.)

Pelletierin Tannate, dose, 0.25 gram (4 grs.) A decoction (1 to 2 oz. bark in 250 c.c. water) is taken in two parts at an interval of one hour. The bowels should be emptied before and again one or two hours after the drug by a brisk purge.

Pepo (Pumpkin Seeds), dose, 60 to 120 grams (2 to 4 oz.) of the powdered seed, given in emulsion or sugar or honey. A purge should be given afterwards.

XVI. Intestinal Astringents

Tannic Acid, Iron Salts, Alum

The astringent action of these bodies is due to their power to precipitate albumins and other proteins. A number of proprietary compounds containing Tannic Acid have been put on the market in recent years. Among these are Tannoform (a combination of Tannic Acid and Formaldehyd), Tannalbin (Tannic Acid and Albumen), Tannocol (Tannic Acid and Gelatin), etc.

Preparation and Dosage:
Tannic Acid, dose, 0.1 to 0.6 gram (2 to 10 grs.)
Tannalbin, dose, 0.5 to 2 grams (10 to 30 grs.)
Ferrous Sulphate, dose, 0.05 to 0.3 gram (1 to 5 grs.)
Alum (Alumen, Potassium Aluminum Sulphate), dose, 0.3 to 1 gram (5 to 15 grs.)

Bismuth acts chiefly as a protective powder in the alimentary canal, though it has some astringent properties. Bismuth salts are often given in considerable quantity in making X-ray examinations.

Preparation and Dosage:
Bismuth Subnitrate, dose, 0.3 to 2 grams (5 to 30 grs.)
Bismuth Subcarbonate, dose, 0.3 to 2 grams (5 to 30 grs.)
Bismuth Subgallate, dose, 0.25 gram (4 grs.)
Opium is often given to allay the peristaltic movements of the intestines.

See **Opium**, under Alkaloidal Narcotics and Hypnotics, p. 43.

Crude Opium is best for this purpose, as it is absorbed much more slowly than the pure salts.

Opium, dose, 0.1 gram ($1\frac{1}{2}$ grs.)

Powdered Opium (Opii Pulvis, 12% Morphin), dose, 0.02 to 0.1 gram ($\frac{1}{3}$ to $1\frac{1}{2}$ grs.)

Deodorized Opium (Opium Deodoratum), dose, 0.02 to 0.1 gram ($\frac{1}{3}$ to $1\frac{1}{2}$ grs.)

XVII. **Antispasmodics**

These are drugs which are believed to lessen states of nervous irritability and hysteria.

Valerian. Fluid Extract of Valerian, dose, 2 to 4 c.c. ($\frac{1}{2}$ to 1 fl. dr.)

Tincture of Valerian, dose, 4 c.c. (1 fl. dr.)

Asafetida. Emulsion of Asafetida, dose, 15 to 30 c.c. ($\frac{1}{2}$ to 1 fl. oz.)

Tincture of Asafetida, dose, 1 to 2 c.c. (15 to 30 mins.)

XVIII. **Acidifiers**

Dilute acids, as vinegar, etc., are used in the treatment of poisoning by alkalies.

Dilute Hydrochloric Acid is sometimes prescribed when the natural acid of the gastric juice is deficient or absent.

Dilute Acetic Acid (6%), dose, 1 c.c. and upward.

Vinegar (Acetum) is an impure dilute Acetic Acid.

Hydrochloric or Muriatic Acid (Acidum Hydrochloricum) is generally used as Acidum Hydro-

chloricum Dilutum, 10%. Dose, 1 c.c. (15 mins.), largely diluted.

Dilute Hydriodic Acid (Acidum Hydriodicum Dilutum), 10%, dose, 1 c.c. (15 mins.)

Dilute Hydrocyanic Acid (Acidum Hydrocyanicum Dilutum), 2%, dose, 0.1 c.c. (1½ mins.)

Hydrocyanic Acid and its salts (cyanides) are very rapid and active poisons.

Nitric Acid, Aqua Fortis (Acidum Nitricum), 68% HNO_3. Sometimes used as a caustic to remove warts, etc.

Sulphuric Acid (Acidum Sulphuricum and Acidum Sulphuricum Dilutum), 10%.

Tannic Acid, Tannin (Acidum Tannicum), light greenish yellow crusts or powder, soluble in less than its weight of water or alcohol, in three parts of glycerin. Tannic Acid is largely employed in cases of poisoning because it forms insoluble precipitates with a large variety of different poisons. As a rule in these cases the stomach should be thoroughly washed out after giving the Tannic Acid.

Trichloracetic Acid (Acidum Trichloraceticum), 10% watery solution, is used in skin diseases and to remove warts, etc.

Oxalic Acid is a dangerous poison.

XIX. **Alkalinizers (Antacids)**

Dilute alkalies are used as antidotes in poisoning with acids. In Hyperchlorhydria, Sodium Bicarbonate is often prescribed to relieve the pain (heart burn) by neutralizing the excess of Hydrochloric

Acid. Alkali carbonates and bicarbonates and the Sodium or Potassium salts of Acetic or Citric Acid are often used to render the urine alkaline.
Lime Water (Liquor Calcis, Aqua Calcis) containing 0.17% of Calcium Hydroxid at 15° C. Dose, 16 c.c. (4 fl. dr.)
Potassium Hydroxid, 5%. Dose, 1 c.c. (15 mins.), largely diluted; rarely used internally.
Sodium Hydroxid, 5%. Use, chemical reagent.
Ammonia Water (Aqua Ammoniæ, 10% NH_3) and stronger ammonia water (Aqua Ammoniæ Fortior, 28% NH_3) may also be listed here.
The salts of the alkalies and alkalin earths (Ammonium, Potassium, Sodium, Lithium, Magnesium, Calcium, etc.), especially the Carbonates, Bicarbonates, Borates, Acetates, Citrates and Tartrates, may be mentioned.
Cerium Oxalate (1 to 8 grs.) is used as a gastric sedative.
Lead Acetate (2 to 5 grs.) has a limited use as an intestinal astringent and in a few preparations for local application.

XX. Local Anesthetics

Some substances when applied in solution locally, either by merely bathing mucus membranes or by injecting under the epidermis or mucosa, or into the tissues so as to reach sensory nerves, will produce a loss or impairment of certain sensations, especially those of pain. Other sensations, as touch, heat or cold, smell, taste, etc., may be more or less

depressed or completely abolished, depending on the drug, its concentration and the method of application. If the drug be injected into a nerve trunk supplying a certain part of the body, as an arm or leg, then sensation (usually mainly pain) may be lost throughout the whole extent of the limb below the injection. This is known as **Regional Anesthesia.** If the drug be injected into the spinal canal, then sensation may be lost throughout all that portion of the body below the injection and often for some distance above. This is known as **Spinal Anesthesia.** Cocain and its derivatives are the best known local anesthetics.

Cocain (Cocaina), an alkaloid derived from the leaves of Erythroxylon, a tropical plant.

Coca, colorless crystals, with a bitter taste followed by numbness. Soluble in alcohol but not in water. The medicinal uses of cocain are almost entirely dependent on its local anesthetic action. It also has a local styptic action. See under Arteriole Constrictors, p. 36.

Preparation and Dosage:

Cocain Hydrochlorid, colorless crystals, very soluble in water and alcohol. Watery solutions must not be sterilized by boiling, as the alkaloid tends to decompose. A small amount of Adrenalin is often added to Cocain solutions to cause a greater local vasoconstriction and thus delay the general absorption of the Cocain. This also enhances the local anesthetic action by keeping the Cocain longer in

contact with the tissues. A 4% solution of Cocain Hydrochlorid applied to a mucus membrane will cause complete anesthesia, but a 1% or 2% solution may allay pain. In the nose and throat, solutions varying from 4% to 10% or even 20% are used.

In **Infiltration Anesthesia** a large quantity (perhaps 200 c.c.) of 8% salt solution, containing 0.01% of Cocain, is allowed through a fine hypodermic needle to permeate the tissues of the region to be operated on. Much of this solution escapes through the incisions, and general poisoning is not liable to occur.

In **Spinal Anesthesia** a lumbar puncture is made and 1 or 2 c.c. of spinal fluid withdrawn. The 1 c.c. of a 2% solution (0.02 gram, $\frac{1}{3}$ grain) of Cocain Chlorid in aqueous solution is injected.

A considerable number of substances possess local anesthetic properties and several have been used as substitutes for Cocain. Among these may be mentioned Eucain or Beta-Eucain, Tropacocain, Stovain, Alypin, **Novocain**, Anesthesin, Yohimbin, Holocain, Nirvanin, Chloretone, Propaesin, Orthoform, etc.

Menthol and Phenol also cause loss of sensation when locally applied. Menthol also produces a sensation of cold. A spray of Ethylchlorid and also of ether produces local anesthesia by freezing the tissues. This is due to the cold produced by the sudden evaporation of the solutions.

ANTIDOTES AND TREATMENT FOR POISONING BY

Acetanilid. Symptoms: Collapse, cyanosis, slow respiration, feeble, irregular pulse, vomiting, sweating, etc. Treatment: Caffein, heat, Strychnin, Digitalis, oxygen inhalations or artificial respiration. Atropin may be given in small doses to stimulate the respiration. Aromatic Spirits of Ammonia. The stomach may be washed out if necessary.

Acid, Acetic. Symptoms: Gastrointestinal irritation and collapse.
Treatment: Magnesia, soap and water, lime water, chalk, milk, oils and thick gruel.

Acid, Carbolic. (Phenol.) Symptoms: Collapse, cold, clammy skin, burning from mouth to stomach, nervous tremors, excitement or convulsions, smoky or dark, greenish urine, slow respiration, weak, feeble pulse.
Treatment: Lavage with 10% Alcohol at once. Epsom Salts, soapsuds, heat, Caffein, Atropin, Aromatic Spirits of Ammonia, Strychnin, Digitalis.

Acid, Hydrocyanic (Prussic), also **Cyanids,** as **Potassium Cyanid, Sodium Cyanid,** etc.
Symptoms: Excitement, tremors, convulsions, dilated pupils, weakness, prostration, collapse, cold, clammy skin; slow, shallow, convulsive respirations (or Cheyne-Stokes type), feeble pulse, etc. Death from respiratory and cardiac failure in a few seconds after a large dose of the acid. The salts act some-

what more slowly. Sodium Hyposulphate may be given intravenously.

Treatment: Artificial respiration, Ammonia inhalations, Caffein, brandy, etc. Lavage of the stomach may be advisable if cyanids (KCN, etc.) have been taken. Recovery or death usually occurs quickly.

Acid, Oxalic. Symptoms: Gastrointestinal irritations, convulsions, collapse. Death from respiratory paralysis.

Treatment: Lime water, chalk, whiting, wall plaster in water, Magnesia, mucilaginous drinks.

Acids, Mineral (Hydrochloric, Nitric, Sulphuric, etc.) Symptoms: Gastrointestinal irritation and collapse, pain in mouth, throat and stomach.

Treatment: Alkalies, as Magnesia, chalk, soap, whiting, wall plaster in water, albumen, flour, milk, starch, olive oil. Carbonates and Bicarbonates should be avoided, if possible. Avoid water in Sulphuric Acid cases. Warmth, Opium for the pain, Caffein and general stimulants.

Aconite. See under Heart Depressants, p. 33.

Alcohol. Treatment: Emetics or lavage, cold affusion to the head, warmth to the extremities and trunk, artificial respiration. Drugs: Caffein, Strychnin, Camphor, Atropin.

Alkalies. Symptoms: Gastrointestinal irritation, corrosion of mouth, throat and stomach.

Treatment: Diluted vegetable acids, as vinegar, lemon juice, etc., milk, gelatin, oils, Caffein, Aromatic Spirits of Ammonia and other stimulants.

Ammonia. See **Alkalies.**

Amyl Nitrite and other nitrites (including Nitroglycerin.)

Symptoms: Fullness and throbbing in the head, flushing, dilated pupils, deep, labored respiration, anxiety and restlessness. More severe symptoms are grave depression, cold extremities, collapse, etc.; persistent headache, possible convulsions and death from respiratory paralysis. Methemoglobin is formed in the blood. The blood pressure is very low.

Treatment: Caffein, Strychnin, Ammonia, Atropin, artificial respiration.

Anesthetics (Ether, Chloroform, etc.)

Treatment: Artificial respiration. Adrenalin intravenously in small doses. Oxygen, Caffein, Atropin, Strychnin, Ammonia. Keep up body warmth. Lower patient's head, draw tongue well forward intermittently to stimulate respiration. Electrical stimulation, hypodermic injection of camphorated oil, brandy, ether, etc., to stimulate respiration reflexly from the local irritation. The insertion of a rectal speculum may start up the respiration.

Antimony (Tartar emetic.) Give Tannic Acid.

Antipyrin. See Acetanilid.

Atropin and **Belladonna.** See under Respiratory Stimulants, p. 48.

Chloral. See under Anesthetics. Wash out the stomach. Coffee. Enemata. External heat. Artificial respiration. Cardiac stimulants.

Cocain. Symptoms of acute poisoning: Nervousness, restlessness, excitement, convulsions, faintness, weakness, pallor, cardiac and respiratory depression.
Treatment: Evacuate stomach if drug has been taken by mouth. Tannic Acid may be given. Amyl Nitrite has been advised for the high blood pressure and a few whiffs of chloroform or ether for the convulsions.
Caffein and Aromatic Spirits of Ammonia may be of use in the later stages.

Colchicum. Give emetics or lavage of the stomach. Tannic Acid may be given to precipitate the poison. External warmth, Caffein, Strychnin and general stimulants may be used.

Digitalis (Digitoxin, etc.) See under Heart Stimulants, Digitalis, p. 27.

Mercury (Bichlorid, etc., Corrosive Sublimate). Acute symptoms: Gastrointestinal irritation, with great pain, vomiting and diarrhea, collapse.
Treatment: Egg albumen (1 egg for each 4 grains of the poison), demulcents, milk. Later, saline diuretics and rectal irrigation.

Opium, Morphin, Codein, Heroin, Laudanum, Paregoric, etc. See under **Narcotics** and **Hypnotics**, p. 43.

Phenacetin. See **Acetanilid.**

Formaldehyd. Ammonia (well diluted) or ammonium salts is the chemic antidote, forming Urotropin. These should be followed by demulcents, such as bland oils, milk, white of eggs, starch water, etc.

Fish Poison (Ptomaine). Emetics, cathartics, enemata, etc.

Illuminating Gas. Treatment: Oxygen, artificial respiration, Ammonia vapor, Caffein, black coffee enemata, horizontal position with clothing adjusted so as not to interfere with the respiratory movements, external heat, stimulation, catheterization.

Iodin. Symptoms: Gastrointestinal irritation, colored vomitus.

Treatment: Starch water with lavage, flour, gelatin, albumen.

Lead. Acute Symptoms: Vomiting, colic and collapse.
Treatment: Emetics, lavage, Magnesium Sulphate, external heat and general stimulants.

Silver Nitrate. Symptoms: Gastrointestinal irritation.
Antidote: Common salt (sodium chlorid), albumen, milk, etc.

Phosphorus. Acute Symptoms: Vomiting, abdominal pain, collapse. Vomitus may be luminous in the dark.

Treatment: Emetics, and lavage with Potassium Permanganate (1 : 6000), saline purges, enemata. Avoid all oily or fatty substances, such as olive or castor oil.

Strychnin and **Nux Vomica.** See under Heart Stimulants, p. 29.

Veratrin. See under Heart Depressants, p. 34.

PART IV

COMMON FORMULÆ

A. B. C. Diuretic (Mistura Diuretica)
A half-an-ounce dose contains
Potassium Acetate, gr.viiss
Potassium Bicarbonate, gr.viiss
Potassium Citrate, gr.viiss

Alum Acetate Liquor
Aluminum Sulphate, Glacial Acetic Acid, Calcium Carbonate and Distilled Water

Basham's Mixture (See under Iron, Liquor Ferri et Ammonii Acetatis), p. 66.
One drachm contains approximately
Tincture Ferric Chlorid, m.iiss
Dilute Acetic Acid, m.iiiss
Liquor Ammonium Acetate, m.xxx
Aromatic Elixir, m.vii
Glycerin, m.vii
Water, m.x
Dose, dr.ii+

Blaud's Pills (See under Iron, Massa Ferri Carbonatis), p. 66.
Iron Sulphate, gr.iiss
Potassium Carbonate, gr.iiss

Brown Mixture (Compound Glycyrrhiza Mixture)

One ounce contains
Extract of Licorice, gr.xv
Acacia, gr.xv
Paregoric, dr.i
Wine of Antimony, m.xxx
Spts. of Nitrous Ether, m.xv
Water and Sirup
Dose, dr.i to oz.i

Compound Cathartic Pills (C. C. Pills)

One pill contains
Extract of Colocynth (Compound), gr. 1¼
Calomel, gr.i
Resin of Jalap, gr. ⅓
Powdered Gamboge, gr. ¼

Chloroform Liniment

Chloroform, 30 c.c. in soap liniment, 100 c.c.

Compound Licorice Powder

One drachm contains
Powdered Sugar, gr.xxx
Oil of Fennel, m. ¼
Powdered Senna, gr.xss
Washed Sulphur, gr.v
Dose, dr.ss to ii

Dobell's Solution (Liquor Sodii Boratis Compositus)

Sodium Borate (Borax), dr.ii
Sodium Bicarbonate, dr.ii
Glycerin, dr.iv
Carbolic Acid, m.xx
Distilled Water, q. s. ad oz.xvi

Imperial Drink (Haustus "Cremor Tartari")
Potassium Bitartrate, 160 grains
Spirit of Lemons, 15 minims
Sirup, 3½ ounces
Water, q.s. ad 32 ounces

Red Wash
Zinc Sulphate, 10 grains
Tincture of Lavender, 2 drachms
Water, q. s. ad 4 ounces

Rhubarb and Soda Mixture (Mistura Rhei et Sodæ)
One drachm contains
Sodium Bicarbonate, gr.ii
Fld. Ext. Rhubarb, m.ii
(Fld. Ext. Ipecac)
Glycerin, m.viii
Spirits of Peppermint, m.ii
Water, m.xlvi
Dose, dr.i+

Seidlitz Powders (Compound Effervescing Powder)
Sodium Bicarbonate, 45 grains and
Potassium-Sodium Tartrate (Rochelle Salt), 117 grains in each blue paper
Tartaric Acid, 34 grains in each white paper

Stokes' Expectorant
One drachm dose contains
Ammonium Carbonate, gr.i
Fld. Ext. Senega, m.ii
Fld. Ext. Squill, m.ii
Paregoric, m.xi
Sirup of Tolu
Water

Thiersch's Solution (Liquor Boro-Salicylicus)

Salicylic Acid, gr.xv
Boric Acid, gr.xc
Water, q. s. ad oz.xvi

LATIN PHRASES AND ABBREVIATIONS

aa.	ana	of each
a. c.	ante cibum	before meals
ad	ad	to, up to
ad lib.	ad libitum	at pleasure
alb.	albus	white
alt.	alter	the other
alt. hor.	alternis horis	every other hour
alt. noc.	alterna nocte	every other night
aq.	aqua	water
aq. calc.	aqua calcis	lime water
aq. dest.	aqua destillata	distilled water
aq. pur.	aqua pura	pure water
b. i. d.	bis in die	twice a day
c.	cum	with
c. c.	centimeter cubicum	cubic centimeter
comp.	compositus	compound
dil.	dilutus	dilute
div. in p. æq.	dividatur in partes æquales	Let it be divided into equal parts
dr.	drachma	a drachm (60 grains)
et	et	and
ext.	extractum	extract
F.		Fahrenheit
fl.	fluidus	fluid

fol.	folia	leaves
garg.	gargarisma	a gargle
gm.	gramma	a gramme
gr.	granum	a grain
gtt.	gutta	a drop
h.	hora	hour
hor.	hora	hour
infus.	infusum	an infusion
inject.	injectio	an injection
K.	Kalium	Potassium
lac.	Lac, lactis	milk, of milk
lb.	libra	a pound
liq.	liquor	a solution
lot.	lotio	a lotion
M	Misce	mix
m.	minimum	a minim
min.	minimum	a minim
mist.	mistura	mixture
mol.	mollis	soft
nig.	niger	black
no.	numero	in number
noct.	nocte	at night
O.	octarius	a pint
ol.	oleum	an oil
o. h.	omni hora	every hour
o. m.	omni mane	every morning
o. n.	omni nocte	every night
os	os	the mouth
oz.	uncia	an ounce
p. r. n.	pro re nata	occasionally, as needed

p. c.	post cibum	after meals
per	per	through, by means of
per os		by mouth
per rectum		by rectum
pulv.	pulvis	powder
q. h.	quaqua hora	every hour
q. s.	quantum sufficit	as much as is sufficient
R.	recipe	take
rad.	radix	root
rub.	ruber	red
sem.	semen	seed
s. o. s.	si opus sit	if necessary
sp. gr.		specific gravity
s.	sine	without
ss.	semissis	a half
sol.	solutio	a solution
spt.	spiritus	a spirit
stat.	statim	immediately
s. f.	spiritus frumenti	whisky
s. v. r.	spiritus vini rectificatus	alcohol
s. v. g.	spiritus vini gallici	brandy
syr.	syrup	a sirup
t. i. d.	ter in die	thrice daily
tr.	tinctura	tincture
troch.	trochiscus	a lozenge
ung.	unguentum	an ointment
vin.	vinum	wine

PART V

ANTITOXINS, VACCINES AND SERA

Toxins are specific poisons produced by bacterial growth in suitable media. When they enter the circulating blood from bacteria growing in or upon the tissues of the organism, they are the exciting cause of acute infectious diseases.

Those commonly associated with certain infectious diseases are, notably, Tetanus, Diphtheria, Cholera, Pneumonia, Erysipelas, Typhoid, etc.

Antitoxins are supposititious substances believed to be produced by the cells of the tissues for the defense of the organism against foreign bacterial toxins.

Antitoxic Sera are composed of blood serum containing antitoxin produced therein by the cells of the organism as a result of the repeated injection of a toxin into the tissues of the animal from which the serum is taken.

An Antitoxic Unit is generally recognized as the quantity of an antitoxic serum which will counteract a definite amount of toxin in a guinea pig.

Bacterial Vaccines are suspensions of killed bacteria in sterile salt solution. A preservative, as 0.5% Phenol, is usually added. Generally speaking, vaccines are composed either of the bacteria themselves unchanged (except in so far as they are affected by the heat used in killing them or by pulverization) or are some deriva-

tive of the bacterial cells. A large number of vaccines have recently been placed on the market. While some of these are of great importance, the value of many others is extremely doubtful.

The treatment by the toxic products of diseases due to pathogenic microbes is based upon the theory that germs produce in their culture media substances which, while poisonous to the animal body, may, on the other hand, stimulate the cells of the tissues to generate substances which are capable of neutralizing the toxins (*i. e.*, antitoxins), or perhaps may lead to the death of the bacteria themselves (*i. e.*, bactericidal sera). By "culture media" is meant substances in which bacteria will grow, *e. g.*, agar, gelatin, bouillon, litmus, milk, etc.

In 1891 the following law was formulated by Behring: "The blood serum of an animal which has been artificially rendered immune against a certain infectious disease, when injected into the body of another animal, has power to protect the latter individual against the same disease and to cure the disease after infection has occurred."

The fact of spontaneous recovery from infectious disease indicates that the body has the power to immunize itself against the bacteria and the bacterial products which are its cause. This faith in such immunizing ability is shown in the present method employed in the treatment of pulmonary tuberculosis, of placing the patient under the best conditions of hygiene and trusting for the cure to the inherent power of the body.

The only real success in securing protection against

diseases produced by microörganisms, and in the cure of them, is now known to be based upon the artificial direction of the body's own immunizing ability, by means of removing obstacles to its action, of furnishing appropriate stimulus when such is lacking (vaccines, etc.), or by the addition to the blood stream of specific substances (antitoxins, immune sera, etc.) which the body itself produces, but not in sufficient quantity to be effective against the infection under which it is struggling.

In protection against **Typhoid,** for instance, the use of typhoid vaccine induces the protective mechanism to fortify the blood with elements which are calculated to destroy typhoid bacilli when they enter the body. Quite the same elements appear to be responsible for the recovery from the disease. A good example of success in following nature's lines of treatment in the cure of disease is that obtained in the treatment of **Diphtheria** by antitoxin. Here we furnish, at a time when the body may be lacking in ability to neutralize the toxin of diphtheria, a substance which is known to neutralize diphtheria poison and to render it inert. The remarkable reduction of mortality in diphtheria attests the efficacy of this measure. Not only has the mortality been reduced, but there has been an extraordinary decrease in the severity of symptoms. The prophylactic or immunizing dose in diphtheria is from 500 to 1000 units. The diphtheria unit is the amount of antitoxin necessary to protect an animal against 100 times the fatal dose of toxin for a guinea pig weighing 250 grams.

Immunity is freedom from risk of infection. There are two kinds, Active and Passive.

Active Immunity may be caused by recovery from a natural attack of an infectious disease, or it may be caused by the use of a vaccine which may be composed of living cultures of pathogenic bacteria of diminished or altered virulence, or of bacteria that have been killed by heat. An example of the use of living vaccine is **Vaccination.** For this method is used a culture of the **Smallpox** organism that has been modified by passage through calves by inoculation. By some authors this modified organism is believed to be entirely separate and distinct from the organism which caused human smallpox. Others, however, consider that this germ is identical with the smallpox organism, but that by passage through calves it has lost certain of its original characteristics. This modification is of such a nature that it has lost its power of producing the general disease, smallpox, but it has retained that of causing a local disease, vaccinia or cowpox, otherwise similar in nature. It appears here that through the stimulus which this mild disease furnishes, the cells of the body have derived an increased power to resist infection of smallpox. Here, then, has been made use of the body's own methods of protection against disease.

Another example of the production of active immunity by the use of a vaccine is the treatment for **Rabies** (Hydrophobia). The organism of this disease is unknown, but the virus occurs in the brain, and emulsions of this substance are used for inoculation. Rabbits are inoculated with this and their infected spinal cords are dried and used as a vaccine. This, in gradually increasing degrees of virulence, is given to patients.

The virulence depends upon the time during which the drying has gone on, since drying after a time removes it.

Passive Immunity, or Antitoxic Immunity, is conferred in experimentation by injecting into a susceptible animal the serum of one which has acquired an active immunity to the disease in question. Active immunity takes some time, but passive immunity is established as soon as the serum has become mixed with the blood of the person or animal injected. Hence in severe infections our best hope is in the production of passive immunity. Passive immunity is of brief duration, in general terms from three to six weeks.

All the Antitoxins cause passive immunity.

Anaphylaxis or Serum Sickness. If a small amount of a foreign proteid, as a serum, is injected into an animal and no further treatment is given for a period of about two weeks, it will be found that after that period a certain change has been produced in the tissues of the animal. This changed condition may last for a considerable time, often for several years. It consists in an increased susceptibility to the same proteid as that with which it was first injected. For if after two or three weeks a second injection (which may be very small) is given to the animal, a very marked, often alarming or even fatal series of symptoms may be produced. The nature and outcome of these symptoms vary considerably with different species of animals. In some, as the guinea pig, a bronchial spasm is produced which may lead to death from asphyxia. In other species, as the dog, there is produced a profound fall in blood pressure,

vomiting, purging, dyspnea, general muscular weakness, etc.

In man the symptoms usually observed consist of exanthematous eruptions, fever, edema, general malaise, collapse, etc. These symptoms may be produced by the injection of antitoxic sera or even normal (horse, *e.g.*) serum. They are due to the foreign proteid (serum), and not to the antitoxic element which it contains, for normal horse serum may cause it in a sensitized individual. Certain articles of food, as egg albumen, may act thus upon persons who have become sensitized to this form of proteid.

This increased susceptibility to foreign protein substances has been used as an aid in clinical diagnosis. Examples of this are found in the employment of tuberculin in the diagnosis of tuberculosis, of luetin to diagnose syphilis, etc. Similar diagnostic procedures have been attempted in gonorrhea and other diseases. Schick has recently introduced a test for the determination of the susceptibility of a person to an attack of diphtheria. It consists essentially in determining, by means of the skin reaction following the intracutaneous injection of a minute quantity of diphtheria toxin, whether or not there exists in the individual's tissues an amount of natural antitoxin sufficient to produce immunity against the disease.

USES AND DOSAGE OF ANTITOXINS, VACCINES AND SERA

A very large number of sera and vaccines have recently been placed on the market. Only a few need be mentioned here. The methods by which these preparations are produced, the manner in which they are intended to be administered and the size of the dose vary greatly with different manufacturers. It is generally desirable to secure specific information about each preparation before it is used. Sera should not as a rule be used if they are more than one year old, and it is best to secure the freshest possible samples.

Antidiphtheritic Serum (Diphtheria Antitoxin). The serum of a horse immunized against diphtheria toxin, kept in the dark and at a low temperature in sealed glass tubes. Average dose, 3000 units; prophylactic dose, 500 units.

Antitetanic Serum (Tetanus Antitoxin). Immunizing dose, 1500 units; in tetanus, 3000 to 20000 units every 4 to 8 hours. Of great value as a prophylactic agent, and of some value in later stages of the disease.

Antimeningococcic Serum (Meningitis Antitoxin). A serum prepared from the blood of horses immunized to the meningococcus of Weichselbaum. Useful in the treatment of epidemic cerebrospinal meningitis. Dosage varies with the manufacturer.

Antigonococcic Serum (Gonorrhea Antitoxin). Serum prepared from the blood of rams or horses immunized against the gonococcus. Variable dosage.

Normal Horse Serum. Marketed in vials or syringes containing from 10 to 100 c.c. Sometimes used in the treatment of hemorrhage, hemophilia, etc. Calcium salts or gelatin, etc., may be given in addition, to increase coagulability.

Among the vaccines should be mentioned autogenous vaccines, stock vaccines, typhoid vaccine, smallpox vaccine and tuberculin.

Autogenous Vaccines. Prepared from cultures obtained from the individual to be treated. These usually give the best results.

Stock Vaccines. A large number on the market, varying greatly in character and, as a rule, not used if autogenous vaccines are available. Stock vaccines may contain only one organism, or several organisms. These latter (mixed vaccines) are looked upon with especial disfavor. Bacterial vaccines are used to aid in the production of an active immunity and should be given only when bacteriologic examination has demonstrated the infecting organism. Clinical reports vary greatly in their estimation of the value of vaccines in many acute infections.

Typhoid Vaccine. Widely used in the last few years to produce immunity against typhoid. Its great effectiveness and value has been shown repeatedly among large bodies of soldiers.

Smallpox Vaccine. Vaccine virus is the material obtained from the skin eruptions of calves having vaccinia. Ground up, mixed with glycerin and sold in capillary tubes or as glycerinated points. Clinically it is used to produce immunity against smallpox.

Tuberculin. A large number of preparations on the market, but all practically identical in their physiological effects. There are two general classes of tuberculins: first, those prepared from the germ-free culture-media and containing for the most part only the soluble products of the bacilli (Koch's Old Tuberculin); second, those which contain the greater part of the germ body itself (Koch's New Tuberculin). These preparations vary chiefly in a quantitative way and in absorbability. They are used both for diagnostic and therapeutic purposes.

A few words should be said concerning the treatment of **rabies** or hydrophobia by the use of vaccines. There are several methods, but whatever the method the value of the process cannot be doubted. Active immunization appears necessary because of the long period of incubation (one week to six months or longer) and the localization of the virus in the nerves. After the bite of a rabid animal the probability of a patient's developing the disease depends upon the severity of the bite, its position (that is, whether or not in regions rich in nerves), and on whether the bite is through clothing so that some of the virus is wiped from the teeth. See p. 93.

The **Widal Reaction** for the diagnosis of typhoid fever and the **Wasserman Test** for the diagnosis of syphilis may be mentioned as further examples of the uses of sera.

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